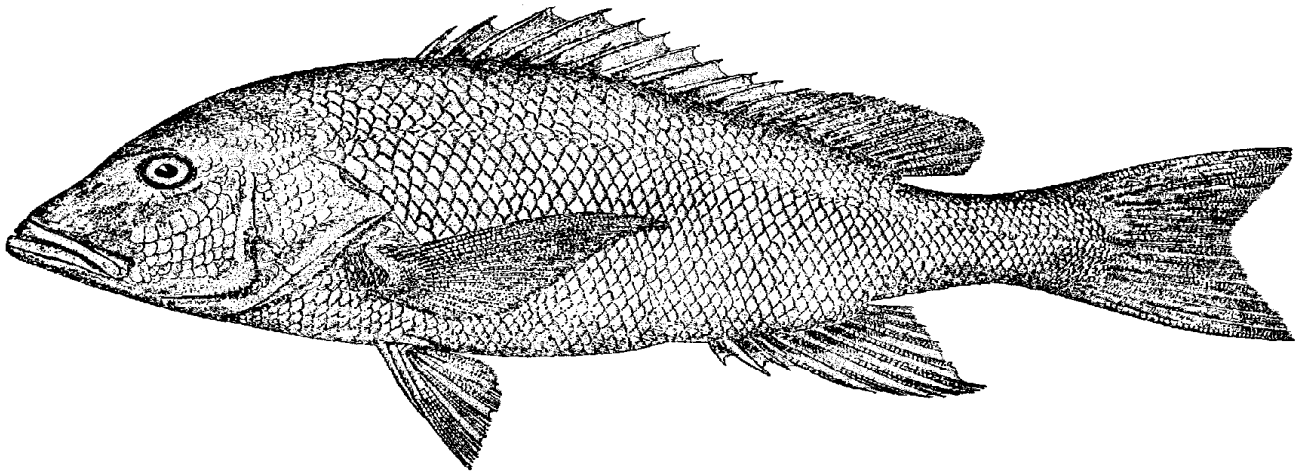
ECONOMIC SUMMARY OF THE GULF OF MEXICO REEF FISH RECREATIONAL FISHERY



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ECONOMIC SUMMARY OF THE GULF OF MEXICO REEF FISH RECREATIONAL FISHERY

This report summarizes selected economic and behavioral aspects associated with the reef fish fishery in the Gulf of Mexico. This information is derived from various sources as noted here and elsewhere in the text. The primary sources of data are the base National Marine Fisheries Service (NMFS) Marine Recreational Fisheries Statistics Survey (MRFSS), the economic add-on to the MRFSS (AMES) conducted from March 1997 through February 1998, the NMFS Headboat Survey, and the Texas Parks and Wildlife Department Survey (TPWD).

PARTICIPATION AND EFFORT

Red Snapper: Estimates of total participation (number of individual anglers) and participation rates (individual fishing trips per angler) for the entire Gulf of Mexico can be estimated using ratios derived from the MRFSS data. In 1997-98 an average of 192,000 and 485,000 trips targeted or caught red snapper in the Gulf of Mexico, respectively (Holiman, 1999a), harvesting an average of 2.49 red snapper per catch trip or 6.34 red snapper per target trip. Based on the MRFSS harvest rates and the Headboat total harvest, the headboat sector contributed 62,000 target trips and 157,000 catch trips. The Texas sector (private and charter anglers) contributed 10,000 target trips and 26,000 catch trips. Gulfwide, approximately 264,000 individual angler trips targeted red snapper, while approximately 668,000 trips caught red snapper.

The 1997-98 average number of marine recreational participants in the Gulf of Mexico, as estimated by the MRFSS data, is 2.0 million anglers. Using the MRFSS ratio of catch trips to participants, an additional 100,000 participants are assumed to participate in the Texas fishery. For the headboat sector, it is assumed that the majority of headboat participants also fish from other modes and have therefore been captured by either the MRFSS or TPWD survey. Total participation in the Gulf of Mexico marine recreational fishery is therefore estimated at 2.1 million anglers.

Combining the estimates of participation, target effort and catch effort, the participation rates for the Gulf of Mexico recreational red snapper fishery are 0.126 target trips per angler and 0.334 catch trips per angler.

ANGLER BEHAVIOR

Information on angler target preferences and behavior is contained in Figures 1-25. Figures 1-2 pertain to general target behavior. Figures 3-11, 12-18 and 19-25 focus on red snapper, red grouper and gag, respectively. Figure 1 shows that red drum and spotted seatrout are the two dominant general target species (species that are targeted at any time during the year) in the Gulf of Mexico, with target rates of approximately 35 percent and 33 percent respectively. Red snapper is the most common reef fish species targeted, at approximately 4.5 percent of respondents, while red grouper and gag were reported as target species by approximately 1 percent and 4 percent of respondents, respectively. Approximately 18 percent of respondents reported not targeting any species. As seen in Figure 2, most anglers who do not target simply just like to fish, while less than 1 percent attribute their behavior decision to regulations or declining stock.

Red Snapper: Approximately 65 percent of those anglers targeting red snapper expect to catch and keep the legal red snapper bag limit on each trip (Figure 3). Fewer than 10 percent of red snapper anglers indicated they had changed the number of fishing trips they normally take or target new species due to red snapper regulations or catch rates over the past two years (the two years prior to March

1997-February 1998) (Figures 4, 6 and 8). For anglers that did alter their behavior, more anglers decreased the number of trips taken and decreased activity at a greater rate than anglers taking an increased number of trips (Figures 5 and 7). These results should be interpreted with caution, however, as the high incidence of "no change" severely reduced observation rates to subsequent questions. Greater amberjack was the dominant new target species for those anglers who had changed their target behavior (Figure 9). Figures 10-11 contain the distribution of anglers' response to their expected reaction to a 0-fish bag limit for red snapper, for all anglers and red snapper anglers, respectively. Approximately 55 percent responded that they did not fish for red snapper and 12 percent indicated they practiced catch and release fishing (Figure 10). Approximately 7 percent of the red snapper anglers responded that they would stop all fishing, while 31 percent indicated they would keep fishing but switch target species (Figure 11).

Red Grouper: Approximately 39 percent of those anglers targeting red grouper expect to catch and keep the legal red grouper bag limit on each trip (Figure 12). Fewer than 10 percent of red grouper anglers indicated they had changed the number of fishing trips they normally take or target new species due to red grouper regulations or catch rates over the past two years (Figures 13, 15 and 17). For anglers that did alter their behavior, more anglers decreased the number of trips taken (Figures 14 and 16). Similar to the results for red snapper, these results should be interpreted with caution, however, as the high incidence of "no change" severely reduced observation rates to subsequent questions. Greater amberjack and king mackerel were the most popular new target species for those anglers who had changed their target behavior (Figure 18). Respondents were not asked their expected reaction to a 0-fish bag limit for red grouper.

Gag: Approximately 41 percent of those anglers targeting gag expect to catch and keep the legal gag bag limit on each trip (Figure 19). Fewer than 10 percent of gag anglers indicated they had changed the number of fishing trips they normally take or target new species due to gag regulations or catch rates over the past two years (Figures 20, 22 and 24). For anglers that did alter their behavior, more anglers decreased the number of trips taken and decreased activity at a greater rate than anglers taking an increased number of trips (Figures 21 and 23). Similar to the results for red snapper, these results should be interpreted with caution, however, as the high incidence of "no change" severely reduced observation rates to subsequent questions. King mackerel was the most popular new target species for those anglers who had changed their target behavior (Figure 25). Respondents were not asked their expected reaction to a 0-fish bag limit for gag.

WILLINGNESS TO PAY

Red Snapper: Willingness to pay to avoid a reduction in the individual daily red snapper bag limit was assessed using data collected in the AMES. Anglers were asked how much they would be willing to pay for a special permit that would allow them to retain the current 5-fish bag limit if the bag limit were reduced for all anglers not purchasing the permit. The new lower bag limits were randomly varied from 0-4 fish, thus representing reductions from 1-5 fish. Summary results are presented in Tables 3-14. Tables 3-13 summarize the actual responses, while Table 14 presents the adjusted average willingness to pay where the adjustment is comprised of dividing the response by the number of fish reduction. The average responses were $2.65, $4.05, $4.91, $6.42 and $4.75 to avoid 1-fish (5 to 4) through 5-fish (5 to 0) reductions in the bag limit, respectively. Significant differences in the average responses were detected between the 1-fish and 3- (5 to 2), 4- (5 to 1) and 5-fish reductions, and between the 2-fish (5 to 3) and 4-fish reductions. For the adjusted willingness to pay, the average per fish willingness to pay ranges from $2.65 per fish under the "5 to 4" alternative to $0.95 per fish under the "5 to 0"

alternative. Again, the average responses between the 1- and 2-fish reductions are not significantly different, while the response to the 1-fish reduction is significantly different from the 3-, 4- and 5-fish reductions.

The average willingness to pay values can be combined with the estimates of total participation previously presented to estimate the total cost to recreational anglers of a bag limit decrease. Using the per fish responses from Table 14, since the average responses to a 1-fish and 2-fish reduction are not significantly different, the true average value of a 1-fish reduction can be assumed to lie somewhere in the range of $2.03 (2-fish reduction) to $2.65 (1-fish reduction). Using the average of these two values, $2.34, and total participation of 2.1 million anglers, the total cost to anglers of a 1-fish reduction in the bag limit is estimated at $4.91 million. An alternative estimation would account for the 35 percent of the respondents who were not willing to purchase the special permit since they did not fish for red snapper. Removing these observations from the analysis, the average willingness to pay to avoid a 1-fish reduction is $3.58. Assuming the 35 percent rate is equally applicable to the total participation estimate, the total cost of a 1-fish reduction in the bag limit is $4.89 million.

Using 1989-91 data, Griffin et al. (1999) estimated the change in consumer surplus associated with a 1-fish increase in the red snapper expected catch rate (from 2.42 fish to 3.42 fish) at $15 per red snapper target trip for historic red snapper target anglers and $79 for anglers newly attracted into the fishery by the higher catch rates. Using the average number of target trips previously reported at 264,000, the new catch rate equates to a gain of $3.96 million for historic red snapper anglers and an unspecified gain for new entrants (it is unclear from the results presented in Griffin et al. how the number of trips by new entrants is estimated). These results are not directly comparable to those presented above because of the differing focus on bag limits vs. catch rates, the differing emphasis on payment to avoid loss (lower bag limit) as opposed to payment to achieve gain (higher catch rate), and the impact higher expected catch rates in recent years due to stock improvements may have had on lowering marginal valuation.

CLOSURE EFFECTS

Red Snapper: Tables 15-16 contain estimates of the number of individual angler trips that might be cancelled under alternative recreational red snapper closure scenarios (0-fish bag limit). Anglers indicating that they targeted red snapper during some portion of the year reported taking an average of 21 fishing trips per year (AMES data). Assuming all these trips were for red snapper and using the previously discussed numbers of total red snapper target trips (264,000) and total red snapper catch trips (668,000), lower and upper bounds for the number of red snapper anglers can be estimated at 12,571 and 31,810 anglers, respectively. As also previously discussed, 6.7 percent of the red snapper anglers interviewed for the AMES indicated they would cease all fishing in the event that the red snapper bag limit were reduced to 0 fish. This equates to from 842 to 2,131 red snapper anglers ceasing angling activity. At 21 trips per angler, this further equates to 17,688 to 44,756 trips on an annual basis. These constitute lower and upper bounds on potential trip cancellations in the event of a 0-fish red snapper bag limit.

Table 15 contains the monthly distribution of red snapper trips as derived from Holiman (1999b). This distribution is combined with the lower and upper trip cancellation bounds to produce cumulative effort totals.

Table 16 contains estimates of the number of potential angler trips that might be cancelled in the 2000 fishing season under alternative recreational red snapper closure scenarios as determined by different TAC scenarios. The estimates assume a

49 percent recreational allocation of TAC. The TAC scenarios evaluated were taken from Reef Fish Stock Assessment Panel (1999). Closure dates were determined using harvest projections derived from Schirripa (1999). Estimated trip cancellations range from 17,700-44,880 trips under a 0 million pound TAC and a year-long closure (January through December) to 6,800-17,300 trips under the status quo 9.12 million pound TAC and a 5-month closure (August through December). As previously discussed, the ranges for each TAC scenario are generated based on whether participation is modeled based on red snapper target trips (generating the lower number in the range) versus red snapper catch trips (generating the upper number in the range). Confidence in the reporting accuracy of target intent would favor selection of the lower bounds. If it is believed, however, that catch performance is a more accurate indicator of target intent, then the upper bounds more accurately reflect cancellation expectations.

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REFERENCES

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Schirripa, M.J. 1999. Gulf of Mexico Recreational Red Snapper Harvest Projection Spreadsheet presented at the Gulf of Mexico Fishery Management Council Recreational Red Snapper Ad Hoc Panel Workshop, April 21-22, 1999. National Marine Fisheries Service, Southeast Fisheries Science Center, Miami Laboratory, Miami, FL.

TABLE 1. REASON FOR NOT WILLING TO PURCHASE THE SPECIAL RED SNAPPER PERMIT ($0 RESPONSE).				
	ALL RESPONDENTS		RED SNAPPER ANGLERS	
RESPONSE	N	PERCENT	N	PERCENT
DOES NOT FISH FOR SPECIES	1603	47.95%		
PRACTICES CATCH AND RELEASE	215	6.43%	215	12.36%
DOES NOT CATCH THE CURRENT LIMIT (5 FISH)	80	2.39%	80	4.60%
LIMITS DO NOT RESTRICT ANGLERS' HARVEST	47	1.41%	47	2.70%
PROPOSED LIMIT IS SUFFICIENT	240	7.18%	240	13.79%
DOES NOT WANT TO PAY ANY MORE TO FISH	241	7.21%	241	13.85%
DOES NOT KNOW WHAT THE CHANGE IS WORTH	32	0.96%	32	1.84%
DOES NOT UNDERSTAND THE PERMIT	24	0.72%	24	1.38%
PERMIT IS UNFAIR	525	15.70%	525	30.17%
DOES NOT BELIEVE IN REGULATIONS	61	1.82%	61	3.51%
OTHER	222	6.64%	222	12.76%
DK/R	53	1.59%	53	3.05%
ALL	3343	100.00%	1740	100.00%

TABLE 2. REASON FOR NOT WILLING TO PURCHASE THE SPECIAL RED SNAPPER PERMIT ($0 RESPONSE), RED SNAPPER ANGLERS, BY PROPOSED NEW LIMIT.

	PROPOSED LIMIT									
	0-FISH		1-FISH		2-FISH		3-FISH		4-FISH	
	N	%	N	%	N	%	N	%	N	%
PROPOSED LIMIT IS SUFFICIENT	17	4.90%	28	9.30%	56	16.23%	59	17.51%	80	19.51%
PERMIT IS UNFAIR	115	33.14%	97	32.23%	104	30.14%	87	25.82%	122	29.76%
ALL RESPONSES	347		301		345		337		410	

TABLE 3. AVERAGE WILLINGNESS TO PAY FOR RED SNAPPER SPECIAL RECREATIONAL HARVEST PERMIT, BY BAG LIMIT ALTERNATIVE, FLORIDA THROUGH LOUISIANA, ALL MODES.

	BAG LIMIT ALTERNATIVES[1]				
	5 TO 4	5 TO 3	5 TO 2	5 TO 1	5 TO 0
AVERAGE ($)	2.65	4.05	4.91	6.42	4.75
STANDARD DEVIATION	8.19	11.29	16.89	16.90	14.49
	SIGNIFICANCE[2]				
5 TO 4		=	**	**	**
5 TO 3	=		=	**	=
5 TO 2	**	=		=	=
5 TO 1	**	**	=		=
5 TO 0	**	=	=	=	

[1]The bag limit alternatives were posed in the manner, if the red snapper bag limit were reduced from the current 5 fish per angler per day to 4 fish, 3 fish, etc., how much would the angler be willing to pay to retain the current 5 fish limit. The anglers' "offer" for the "5 to 4" alternative therefore represents the willingness to pay to forgo a 1-fish reduction in the bag limit, the offer for the "5 to 3" alternative the willingness to pay to forgo a 2-fish reduction, etc.
[2]The symbol "=" denotes equivalent averages and "**" denotes significant difference at the 5% level.

TABLE 4. AVERAGE WILLINGNESS TO PAY FOR RED SNAPPER SPECIAL RECREATIONAL HARVEST PERMIT, BY BAG LIMIT ALTERNATIVE, FLORIDA THROUGH LOUISIANA, SHORE MODE.

	BAG LIMIT ALTERNATIVES[1]				
	5 TO 4	5 TO 3	5 TO 2	5 TO 1	5 TO 0
AVERAGE ($)	2.81	4.01	3.10	6.20	3.74
STANDARD DEVIATION	8.03	10.52	6.95	17.60	10.24
	SIGNIFICANCE[2]				
5 TO 4		=	=	**	=
5 TO 3	=		=	=	=
5 TO 2	=	=		**	=
5 TO 1	**	=	**		=
5 TO 0	=	=	=	=	

[1]The bag limit alternatives were posed in the manner, if the red snapper bag limit were reduced from the current 5 fish per angler per day to 4 fish, 3 fish, etc., how much would the angler be willing to pay to retain the current 5 fish limit. The anglers' "offer" for the "5 to 4" alternative therefore represents the willingness to pay to forgo a 1-fish reduction in the bag limit, the offer for the "5 to 3" alternative the willingness to pay to forgo a 2-fish reduction, etc.
[2]The symbol "=" denotes equivalent averages and "**" denotes significant difference at the 5% level.

TABLE 5. AVERAGE WILLINGNESS TO PAY FOR RED SNAPPER SPECIAL RECREATIONAL HARVEST PERMIT, BY BAG LIMIT ALTERNATIVE, FLORIDA THROUGH LOUISIANA, CHARTER MODE.

	BAG LIMIT ALTERNATIVES[1]				
	5 TO 4	5 TO 3	5 TO 2	5 TO 1	5 TO 0
AVERAGE ($)	2.84	6.94	4.84	11.76	7.68
STANDARD DEVIATION	6.32	14.86	9.08	22.84	14.34
	SIGNIFICANCE[2]				
5 TO 4		=	=	**	=
5 TO 3	=		=	=	=
5 TO 2	=	=		**	=
5 TO 1	**	=	**		=
5 TO 0	=	=	=	=	

[1]The bag limit alternatives were posed in the manner, if the red snapper bag limit were reduced from the current 5 fish per angler per day to 4 fish, 3 fish, etc., how much would the angler be willing to pay to retain the current 5 fish limit. The anglers' "offer" for the "5 to 4" alternative therefore represents the willingness to pay to forgo a 1-fish reduction in the bag limit, the offer for the "5 to 3" alternative the willingness to pay to forgo a 2-fish reduction, etc.
[2]The symbol "=" denotes equivalent averages and "**" denotes significant difference at the 5% level.

TABLE 6. AVERAGE WILLINGNESS TO PAY FOR RED SNAPPER SPECIAL RECREATIONAL HARVEST PERMIT, BY BAG LIMIT ALTERNATIVE, FLORIDA THROUGH LOUISIANA, PRIVATE/RENTAL MODE.

	BAG LIMIT ALTERNATIVES[1]				
	5 TO 4	5 TO 3	5 TO 2	5 TO 1	5 TO 0
AVERAGE ($)	2.56	3.44	5.54	5.39	4.49
STANDARD DEVIATION	8.57	10.53	20.01	14.95	15.66
	SIGNIFICANCE[2]				
5 TO 4		=	**	**	=
5 TO 3	=		=	=	=
5 TO 2	**	=		=	=
5 TO 1	**	=	=		=
5 TO 0	=	=	=	=	

[1]The bag limit alternatives were posed in the manner, if the red snapper bag limit were reduced from the current 5 fish per angler per day to 4 fish, 3 fish, etc., how much would the angler be willing to pay to retain the current 5 fish limit. The anglers' "offer" for the "5 to 4" alternative therefore represents the willingness to pay to forgo a 1-fish reduction in the bag limit, the offer for the "5 to 3" alternative the willingness to pay to forgo a 2-fish reduction, etc.
[2]The symbol "=" denotes equivalent averages and "**" denotes significant difference at the 5% level.

TABLE 7. AVERAGE WILLINGNESS TO PAY FOR RED SNAPPER SPECIAL RECREATIONAL HARVEST PERMIT, BY BAG LIMIT ALTERNATIVE, ALABAMA.

	BAG LIMIT ALTERNATIVES[1]				
	5 TO 4	5 TO 3	5 TO 2	5 TO 1	5 TO 0
AVERAGE ($)	2.76	3.37	7.45	5.38	5.01
STANDARD DEVIATION	7.45	7.28	19.27	14.67	11.86
	SIGNIFICANCE[2]				
5 TO 4		=	=	=	=
5 TO 3	=		=	=	=
5 TO 2	=	=		=	=
5 TO 1	=	=	=		=
5 TO 0	=	=	=	=	

[1]The bag limit alternatives were posed in the manner, if the red snapper bag limit were reduced from the current 5 fish per angler per day to 4 fish, 3 fish, etc., how much would the angler be willing to pay to retain the current 5 fish limit. The anglers' "offer" for the "5 to 4" alternative therefore represents the willingness to pay to forgo a 1-fish reduction in the bag limit, the offer for the "5 to 3" alternative the willingness to pay to forgo a 2-fish reduction, etc.
[2]The symbol "=" denotes equivalent averages and "**" denotes significant difference at the 5% level.

TABLE 8. AVERAGE WILLINGNESS TO PAY FOR RED SNAPPER SPECIAL RECREATIONAL HARVEST PERMIT, BY BAG LIMIT ALTERNATIVE, FLORIDA.

	BAG LIMIT ALTERNATIVES[1]				
	5 TO 4	5 TO 3	5 TO 2	5 TO 1	5 TO 0
AVERAGE ($)	2.69	3.90	4.46	6.71	4.84
STANDARD DEVIATION	7.78	10.39	12.69	17.26	15.94
	SIGNIFICANCE[2]				
5 TO 4		=	=	**	=
5 TO 3	=		=	**	=
5 TO 2	=	=		**	=
5 TO 1	**	**	**		=
5 TO 0	=	=	=	=	

[1]The bag limit alternatives were posed in the manner, if the red snapper bag limit were reduced from the current 5 fish per angler per day to 4 fish, 3 fish, etc., how much would the angler be willing to pay to retain the current 5 fish limit. The anglers' "offer" for the "5 to 4" alternative therefore represents the willingness to pay to forgo a 1-fish reduction in the bag limit, the offer for the "5 to 3" alternative the willingness to pay to forgo a 2-fish reduction, etc.
[2]The symbol "=" denotes equivalent averages and "**" denotes significant difference at the 5% level.

TABLE 9. AVERAGE WILLINGNESS TO PAY FOR RED SNAPPER SPECIAL RECREATIONAL HARVEST PERMIT, BY BAG LIMIT ALTERNATIVE, LOUISIANA.

	BAG LIMIT ALTERNATIVES[1]				
	5 TO 4	5 TO 3	5 TO 2	5 TO 1	5 TO 0
AVERAGE ($)	2.58	3.27	4.40	4.93	4.34
STANDARD DEVIATION	9.45	11.28	18.83	12.27	12.16
	SIGNIFICANCE[2]				
5 TO 4		=	=	=	=
5 TO 3	=		=	=	=
5 TO 2	=	=		=	=
5 TO 1	=	=	=		=
5 TO 0	=	=	=	=	

[1]The bag limit alternatives were posed in the manner, if the red snapper bag limit were reduced from the current 5 fish per angler per day to 4 fish, 3 fish, etc., how much would the angler be willing to pay to retain the current 5 fish limit. The anglers' "offer" for the "5 to 4" alternative therefore represents the willingness to pay to forgo a 1-fish reduction in the bag limit, the offer for the "5 to 3" alternative the willingness to pay to forgo a 2-fish reduction, etc.
[2]The symbol "=" denotes equivalent averages and "**" denotes significant difference at the 5% level.

TABLE 10. AVERAGE WILLINGNESS TO PAY FOR RED SNAPPER SPECIAL RECREATIONAL HARVEST PERMIT, BY BAG LIMIT ALTERNATIVE, MISSISSIPPI.

	BAG LIMIT ALTERNATIVES[1]				
	5 TO 4	5 TO 3	5 TO 2	5 TO 1	5 TO 0
AVERAGE ($)	2.41	9.09	10.09	10.23	5.30
STANDARD DEVIATION	7.49	20.06	38.04	26.96	10.99
	SIGNIFICANCE[2]				
5 TO 4		=	=	=	=
5 TO 3	=		=	=	=
5 TO 2	=	=		=	=
5 TO 1	=	=	=		=
5 TO 0	=	=	=	=	

[1]The bag limit alternatives were posed in the manner, if the red snapper bag limit were reduced from the current 5 fish per angler per day to 4 fish, 3 fish, etc., how much would the angler be willing to pay to retain the current 5 fish limit. The anglers' "offer" for the "5 to 4" alternative therefore represents the willingness to pay to forgo a 1-fish reduction in the bag limit, the offer for the "5 to 3" alternative the willingness to pay to forgo a 2-fish reduction, etc.
[2]The symbol "=" denotes equivalent averages and "**" denotes significant difference at the 5% level.

TABLE 11. AVERAGE WILLINGNESS TO PAY FOR RED SNAPPER SPECIAL RECREATIONAL HARVEST PERMIT, BY BAG LIMIT ALTERNATIVE, FLORIDA, SHORE MODE.

	BAG LIMIT ALTERNATIVES[1]				
	5 TO 4	5 TO 3	5 TO 2	5 TO 1	5 TO 0
AVERAGE ($)	2.80	3.86	3.31	5.50	4.17
STANDARD DEVIATION	8.38	8.71	7.44	11.26	10.79
	SIGNIFICANCE[2]				
5 TO 4		=	=	=	=
5 TO 3	=		=	=	=
5 TO 2	=	=		=	=
5 TO 1	=	=	=		=
5 TO 0	=	=	=	=	

[1]The bag limit alternatives were posed in the manner, if the red snapper bag limit were reduced from the current 5 fish per angler per day to 4 fish, 3 fish, etc., how much would the angler be willing to pay to retain the current 5 fish limit. The anglers' "offer" for the "5 to 4" alternative therefore represents the willingness to pay to forgo a 1-fish reduction in the bag limit, the offer for the "5 to 3" alternative the willingness to pay to forgo a 2-fish reduction, etc.
[2]The symbol "=" denotes equivalent averages and "**" denotes significant difference at the 5% level.

TABLE 12. AVERAGE WILLINGNESS TO PAY FOR RED SNAPPER SPECIAL RECREATIONAL HARVEST PERMIT, BY BAG LIMIT ALTERNATIVE, FLORIDA, CHARTER MODE.

	BAG LIMIT ALTERNATIVES[1]				
	5 TO 4	5 TO 3	5 TO 2	5 TO 1	5 TO 0
AVERAGE ($)	3.18	7.17	4.20	13.30	7.31
STANDARD DEVIATION	6.61	16.46	7.42	24.30	14.51
	SIGNIFICANCE[2]				
5 TO 4		=	=	**	=
5 TO 3	=		=	=	=
5 TO 2	=	=		**	=
5 TO 1	**	=	**		=
5 TO 0	=	=	=	=	

[1]The bag limit alternatives were posed in the manner, if the red snapper bag limit were reduced from the current 5 fish per angler per day to 4 fish, 3 fish, etc., how much would the angler be willing to pay to retain the current 5 fish limit. The anglers' "offer" for the "5 to 4" alternative therefore represents the willingness to pay to forgo a 1-fish reduction in the bag limit, the offer for the "5 to 3" alternative the willingness to pay to forgo a 2-fish reduction, etc.
[2]The symbol "=" denotes equivalent averages and "**" denotes significant difference at the 5% level.

TABLE 13. AVERAGE WILLINGNESS TO PAY FOR RED SNAPPER SPECIAL RECREATIONAL HARVEST PERMIT, BY BAG LIMIT ALTERNATIVE, FLORIDA, PRIVATE/RENTAL MODE.

	BAG LIMIT ALTERNATIVES[1]				
	5 TO 4	5 TO 3	5 TO 2	5 TO 1	5 TO 0
AVERAGE ($)	2.52	3.08	4.95	5.58	4.43
STANDARD DEVIATION	7.84	8.70	14.96	16.74	17.90
	SIGNIFICANCE[2]				
5 TO 4		=	=	**	=
5 TO 3	=		=	=	=
5 TO 2	=	=		=	=
5 TO 1	**	=	=		=
5 TO 0	=	=	=	=	

[1]The bag limit alternatives were posed in the manner, if the red snapper bag limit were reduced from the current 5 fish per angler per day to 4 fish, 3 fish, etc., how much would the angler be willing to pay to retain the current 5 fish limit. The anglers' "offer" for the "5 to 4" alternative therefore represents the willingness to pay to forgo a 1-fish reduction in the bag limit, the offer for the "5 to 3" alternative the willingness to pay to forgo a 2-fish reduction, etc.
[2]The symbol "=" denotes equivalent averages and "**" denotes significant difference at the 5% level.

TABLE 14. AVERAGE ADJUSTED WILLINGNESS TO PAY FOR RED SNAPPER SPECIAL RECREATIONAL HARVEST PERMIT, BY BAG LIMIT ALTERNATIVE, FLORIDA THROUGH LOUISIANA. ADJUSTED WILLINGNESS TO PAY = OFFER/REDUCTION IN THE BAG LIMIT.

	BAG LIMIT ALTERNATIVES[1]				
	5 TO 4	5 TO 3	5 TO 2	5 TO 1	5 TO 0
AVERAGE ($)	2.65	2.03	1.64	1.60	0.95
STANDARD DEVIATION	8.19	5.64	5.63	4.23	2.90
	SIGNIFICANCE[2]				
5 TO 4		=	**	**	**
5 TO 3	=		=	=	**
5 TO 2	**	=		=	=
5 TO 1	**	=	=		=
5 TO 0	**	**	=	=	

[1]The bag limit alternatives were posed in the manner, if the red snapper bag limit were reduced from the current 5 fish per angler per day to 4 fish, 3 fish, etc., how much would the angler be willing to pay to retain the current 5 fish limit. The anglers' "offer" for the "5 to 4" alternative therefore represents the willingness to pay to forgo a 1-fish reduction in the bag limit, the offer for the "5 to 3" alternative the willingness to pay to forgo a 2-fish reduction, etc.
[2]The symbol "=" denotes equivalent averages and "**" denotes significant difference at the 5% level.

TABLE 15. ESTIMATED FISHING TRIP CANCELLATIONS AS A RESULT OF A 0-FISH RED SNAPPER BAG LIMIT. ASSUMES 12,571-31,810 RED SNAPPER ANGLERS, 6.7% ANGLER CANCELLATION RATE (842-2141 ANGLERS CANCELLING ALL FISHING TRIPS DURING AFFECTED PERIOD), AND 21 TRIPS PER ANGLER PER YEAR (17,688-44,756 TOTAL FISHING TRIPS BY THESE ANGLERS). THE "REMAINING" ENTRY ASSUMES THE RED SNAPPER FISHERY IS OPEN THROUGH THE END OF THE MONTH.

	MONTHLY TRIP DISTRIBUTION											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
%	3.62	4.08	8.17	8.50	11.52	12.75	12.72	11.74	9.38	8.30	4.79	4.42
	LOWER BOUND = 17,688 TOTAL TRIPS											
TRIPS	640	722	1,445	1,503	2,038	2,255	2,250	2,077	1,659	1,468	847	782
CUM.	640	1,362	2,807	4,311	6,348	8,603	10,853	12,930	14,589	16,057	16,904	17,686
REMAINING	17,046	16,324	14,879	13,376	11,338	9,083	6,833	4,756	3,097	1,629	782	0
	UPPER BOUND = 44,756 TOTAL TRIPS											
TRIPS	1,620	1,826	3,657	3,804	5,156	5,706	5,693	5,254	4,198	3,715	2,144	1,978
CUM.	1,620	3,446	7,103	10,907	16,063	21,769	27,462	32,717	36,915	40,629	42,773	44,752
REMAINING	43,131	41,305	37,649	33,844	28,689	22,982	17,289	12,035	7,837	4,122	1,978	0

TABLE 16. ESTIMATED TOTAL FISHING TRIP CANCELLATIONS (2000 FISHING SEASON) AS A RESULT OF A 0-FISH RED SNAPPER BAG LIMIT, BY TAC SCENARIO.

TAC (MILLION POUNDS)	RECREATIONAL QUOTA	CLOSURE DATE (APPROX.)	CANCELLED TRIPS
0	0	-	17,700-44,800
2.0	0.98	MAR 10	15,800-40,100
2.8	1.37	APR 1	13,400-33,800
3.5	1.72	APR 16	12,400-31,300
5.8	2.84	JUN 1	11,300-28,700
9.12	4.47	AUG 1	6,800-17,300

Figure 1 Distribution of Recreational Anglers' General Target Species, by Subregion

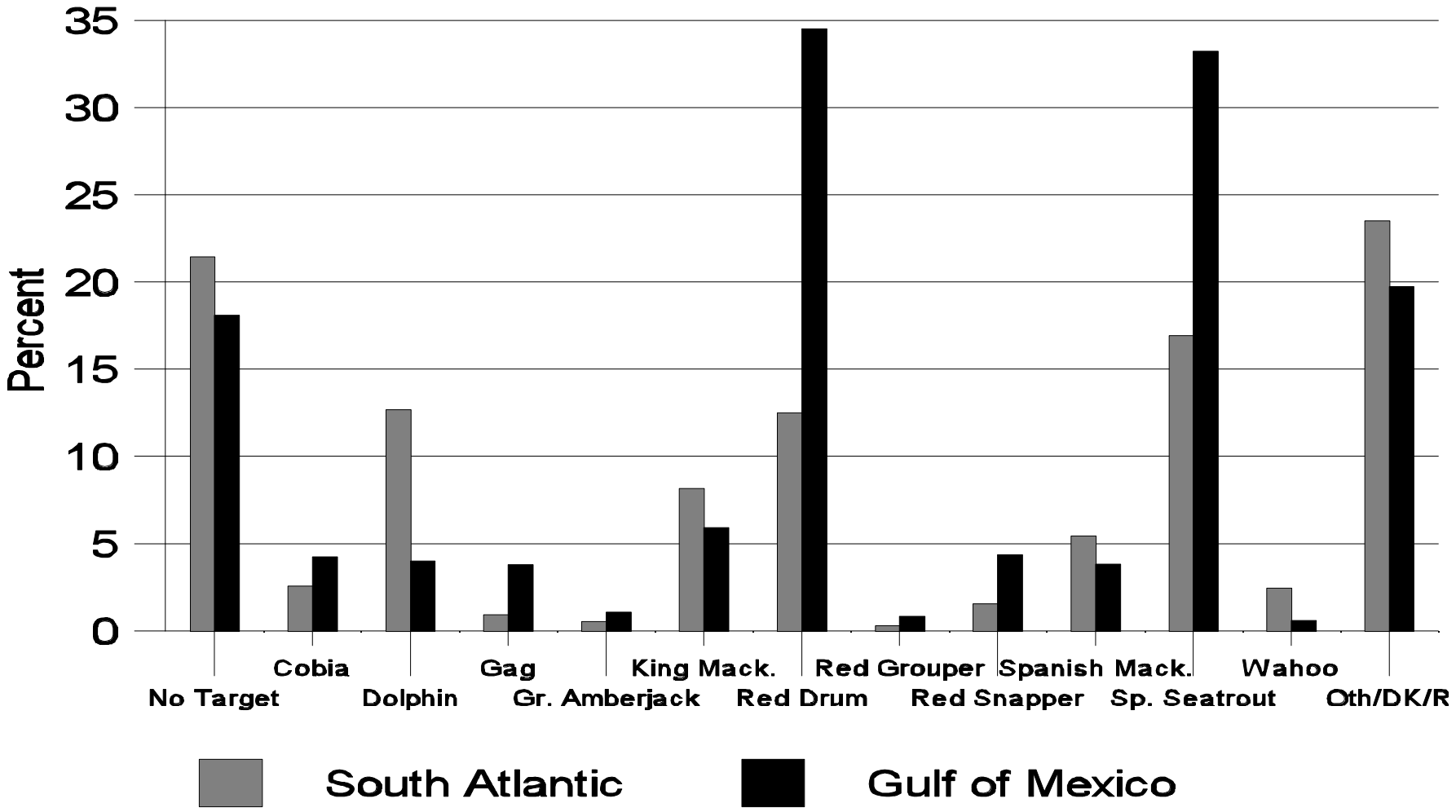

Figure 2 Distribution of Recreational Anglers' Reason for Not Targeting Any Species, by Subregion

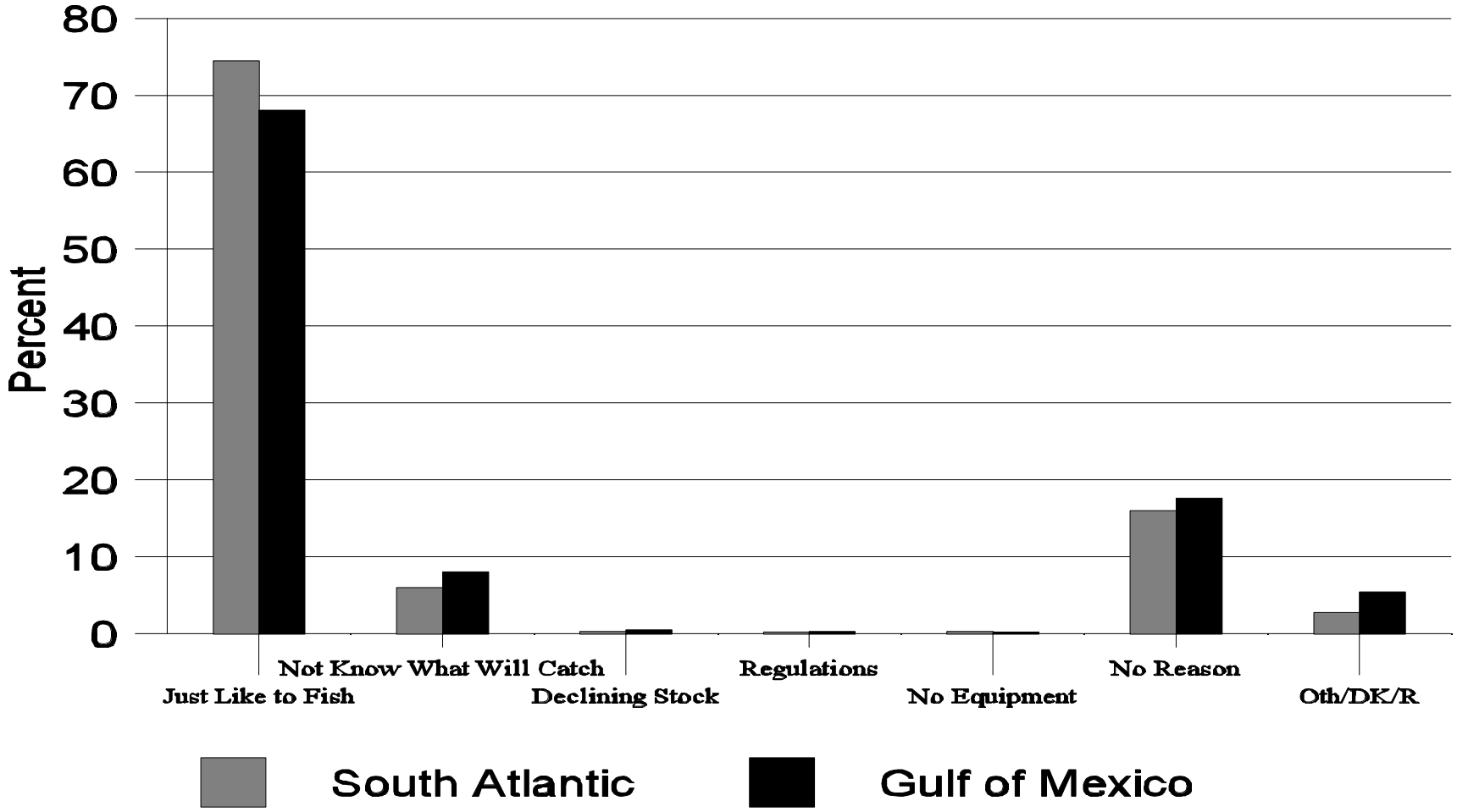

Figure 3 Distribution of Recreational Anglers' Expectations of Catching and Keeping the Legal Red Snapper Limit, by Subregion

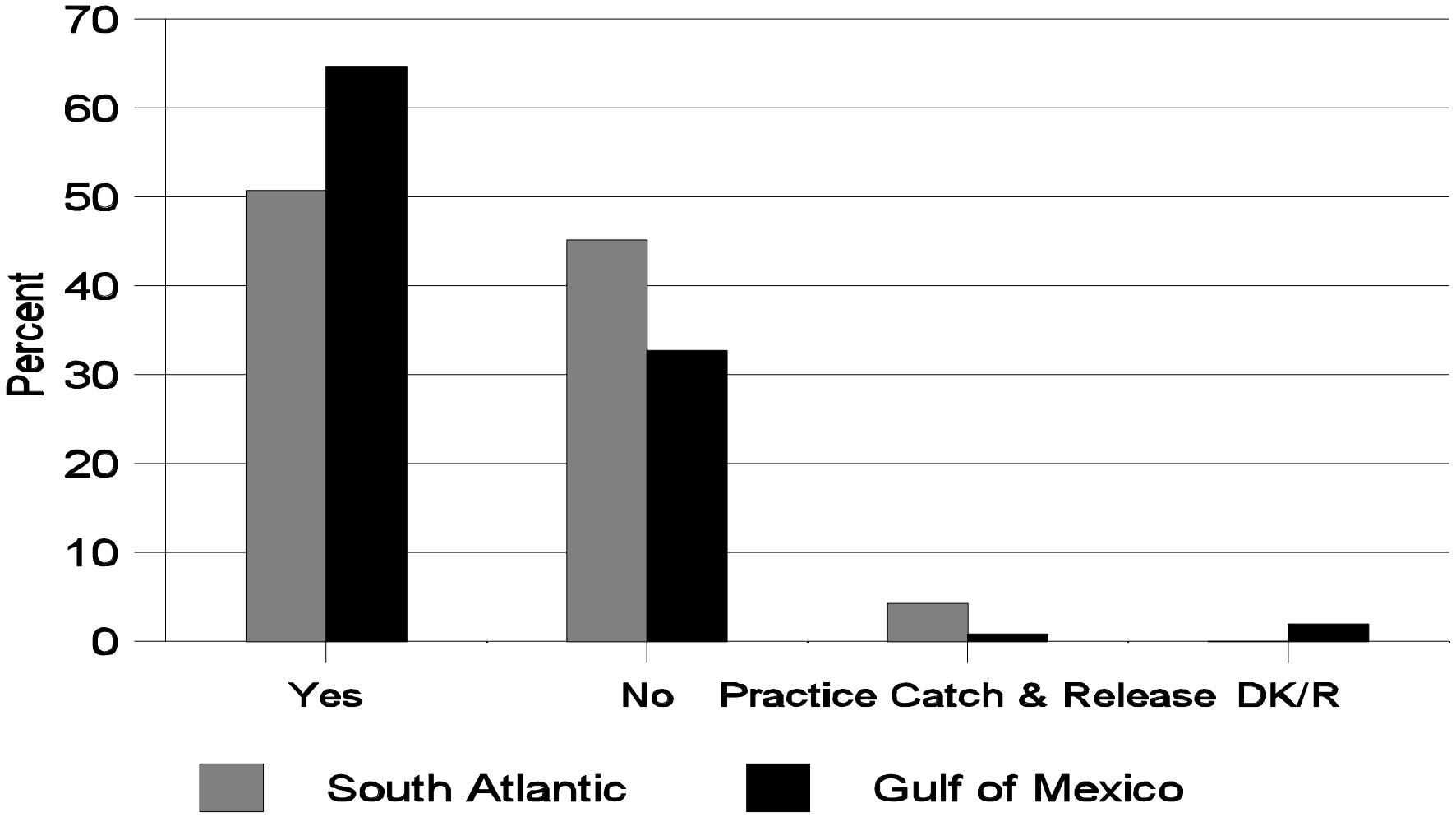

Figure 4 Direction of Recreational Anglers' Behavioral Change in Response to Red Snapper Regulations

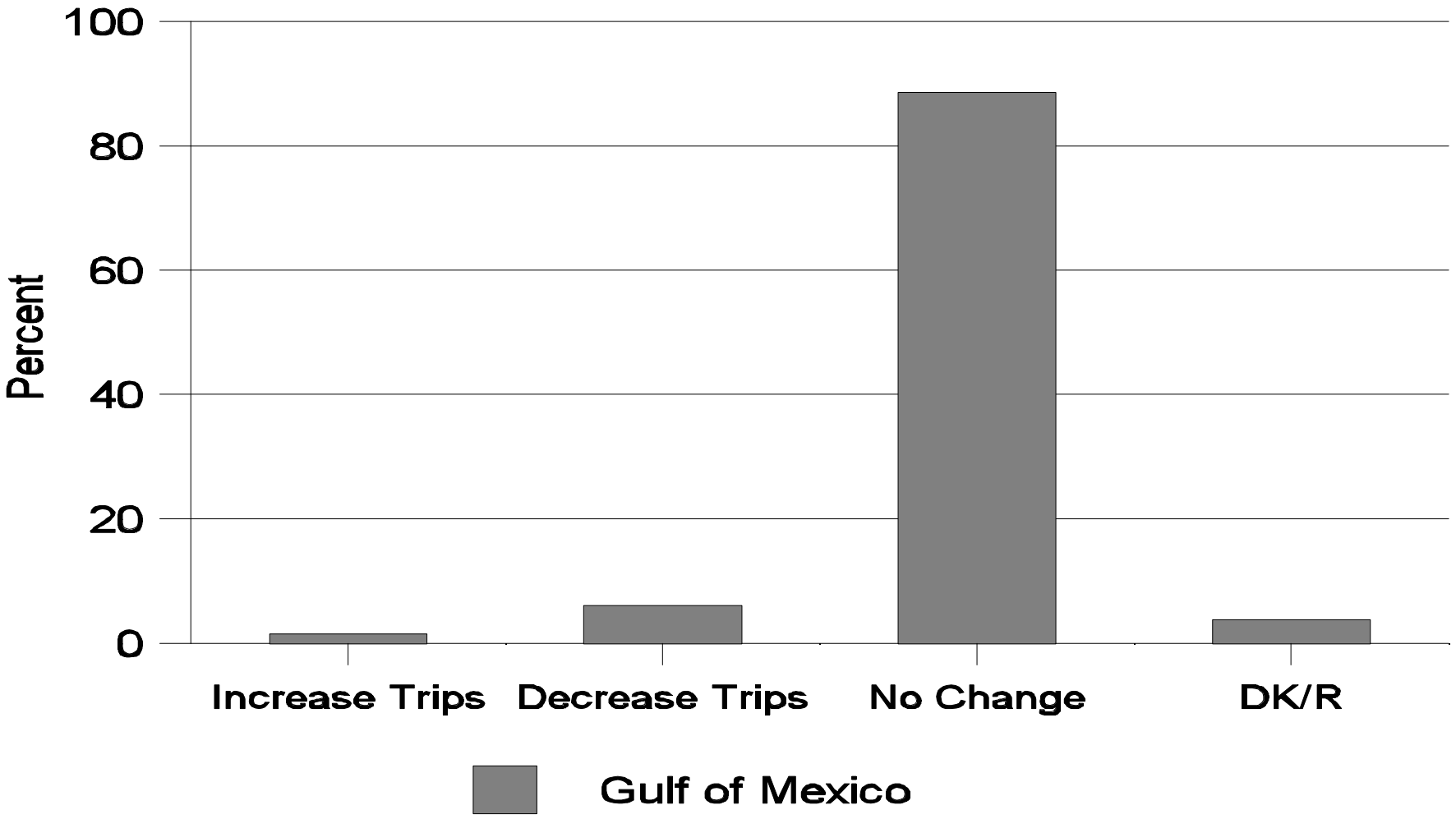

Figure 5 Magnitude of Recreational Anglers' Behavioral Change in Response to Red Snapper Regulations

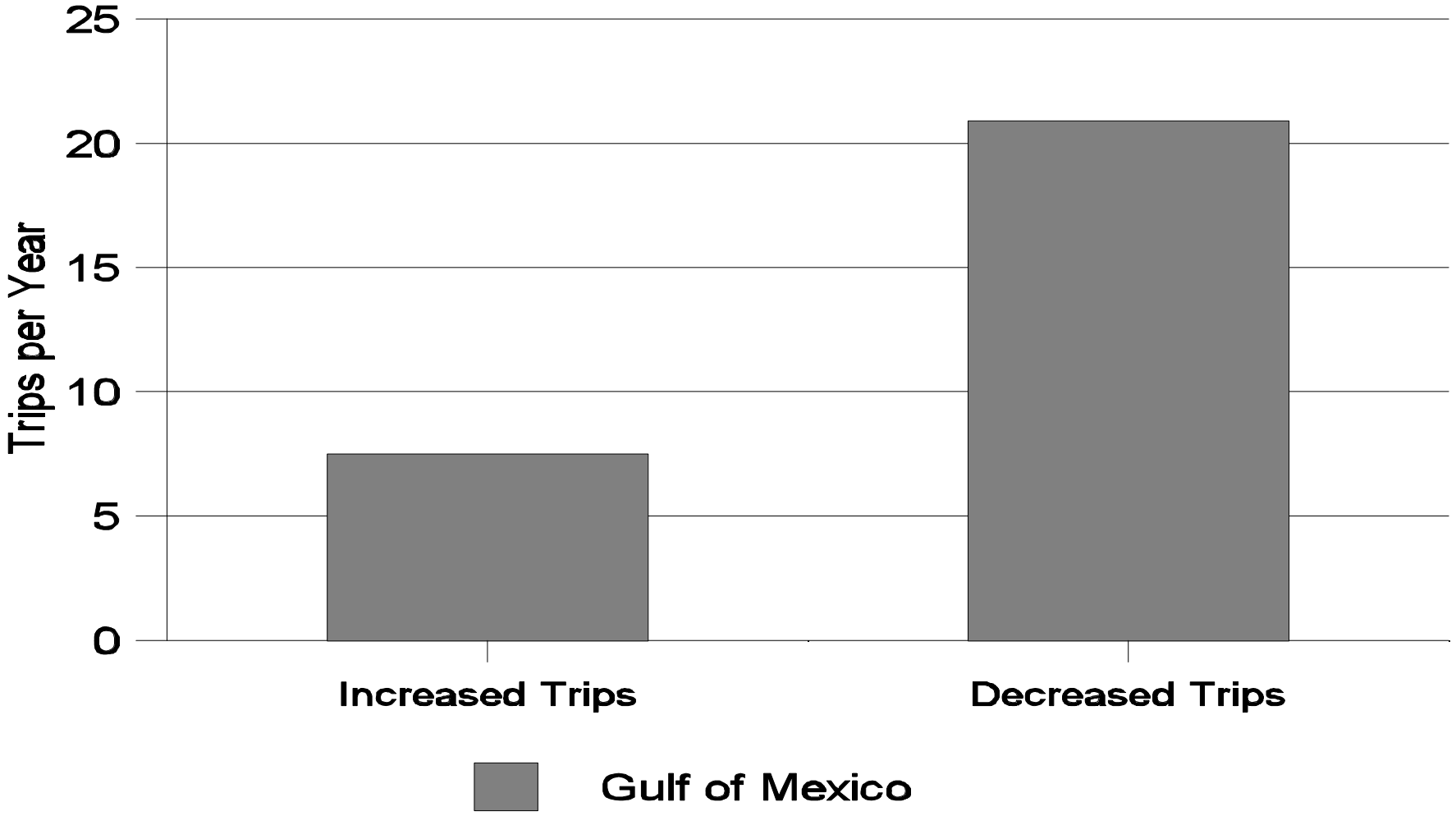

Figure 6 Direction of Recreational Anglers' Behavioral Change in Response to Red Snapper Catch Rates

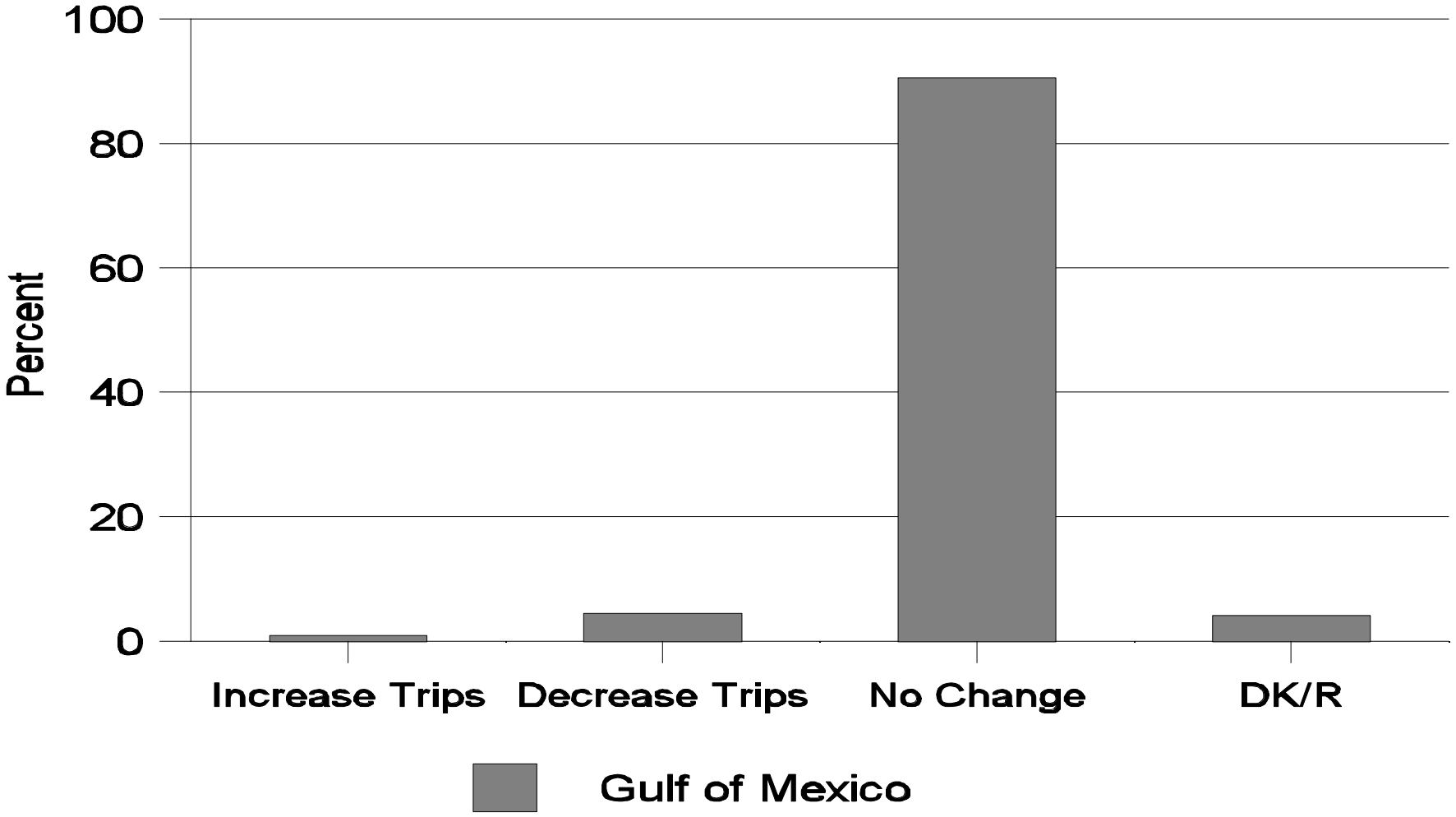

Figure 7 Magnitude of Recreational Anglers' Behavioral Change in Response to Red Snapper Catch Rates

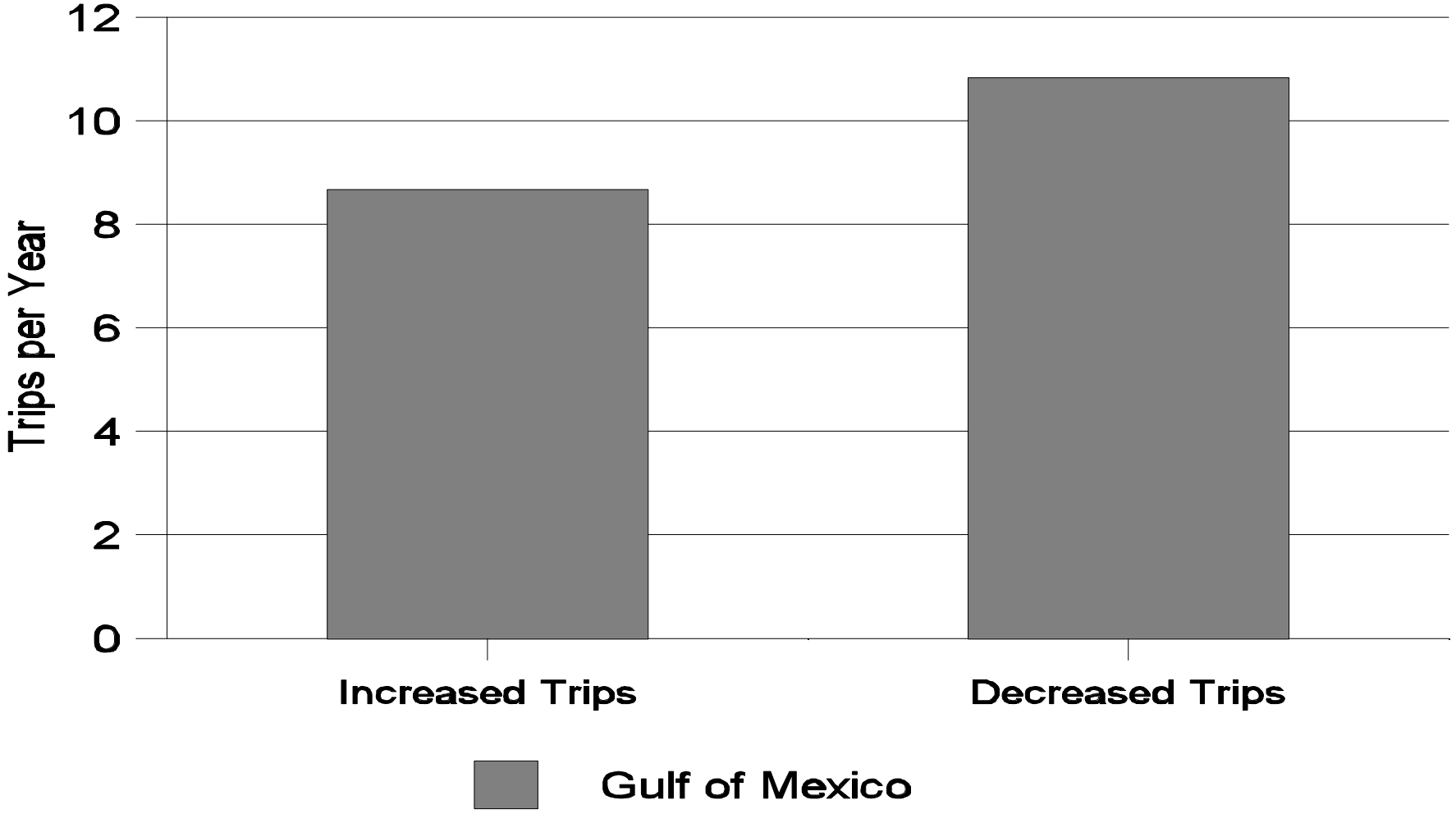

Figure 8 Distribution of Recreational Anglers' Targeting New Species in Response to Red Snapper Regulations or Catch Rates

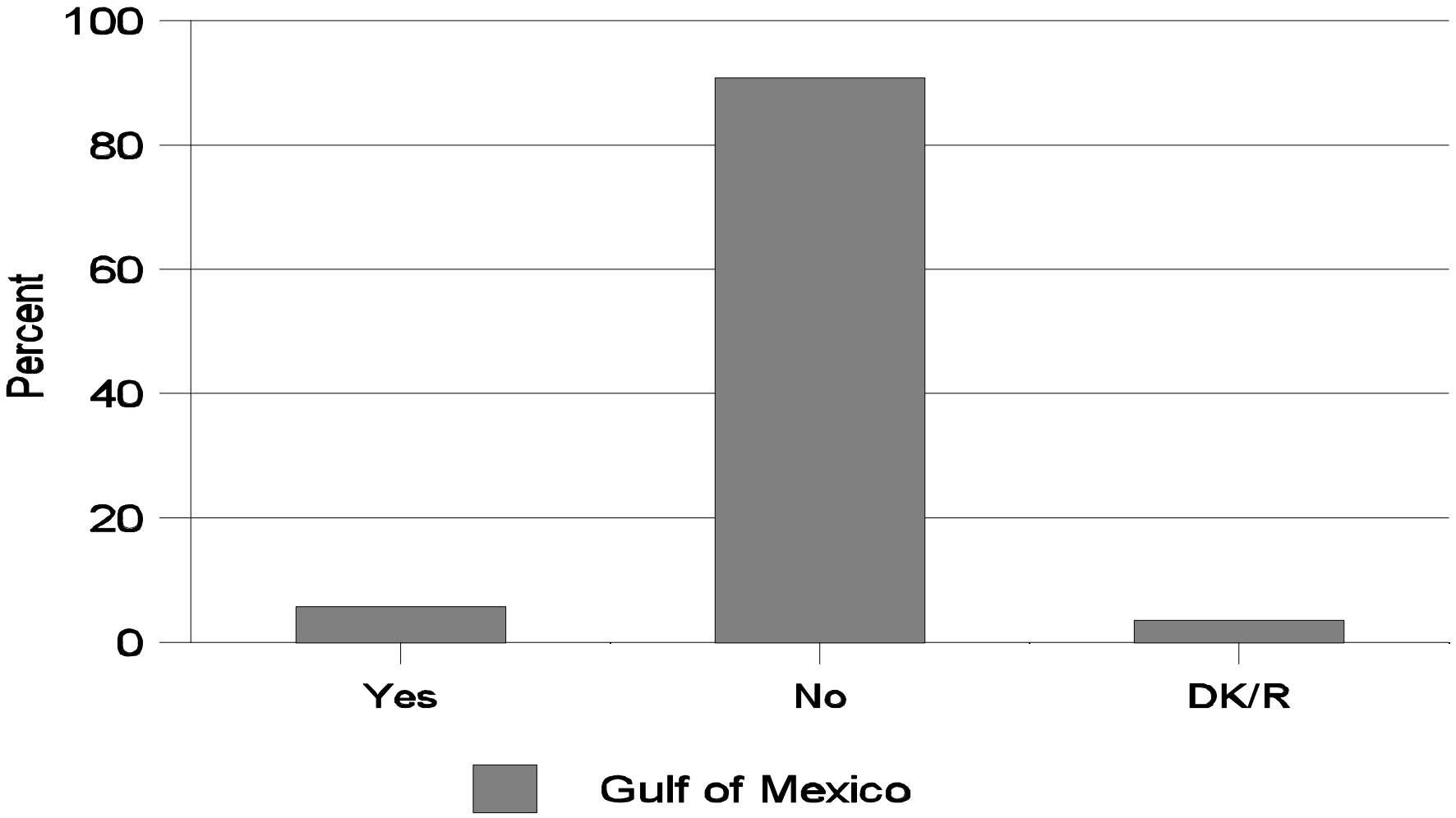

Figure 9 Distribution of Recreational Anglers' New Target Species in Response to Red Snapper Regulations or Catch Rates

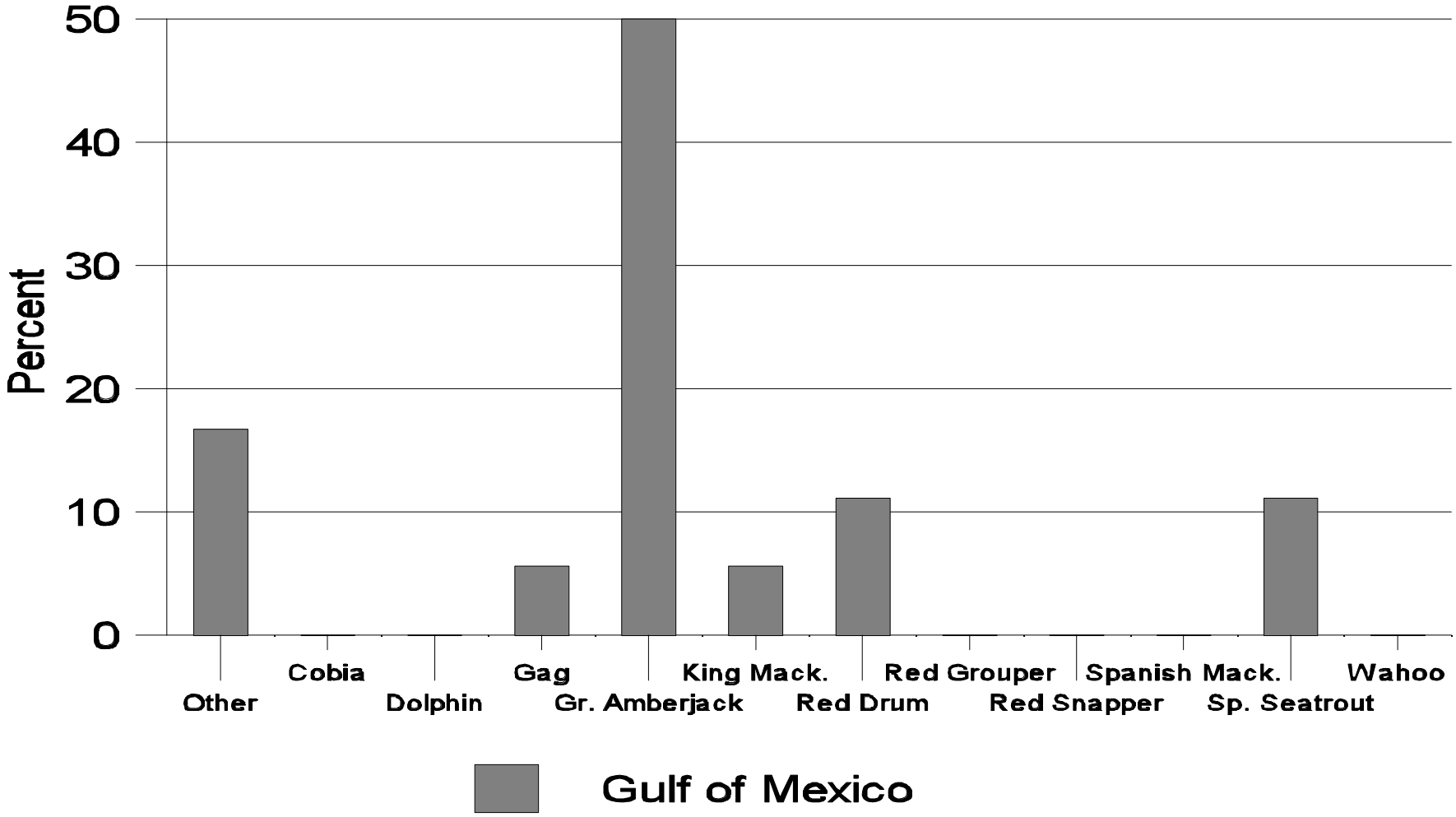

Figure 10 Distribution of Recreational Anglers' Stated Reaction to a Zero Bag Limit for Red Snapper, All Anglers

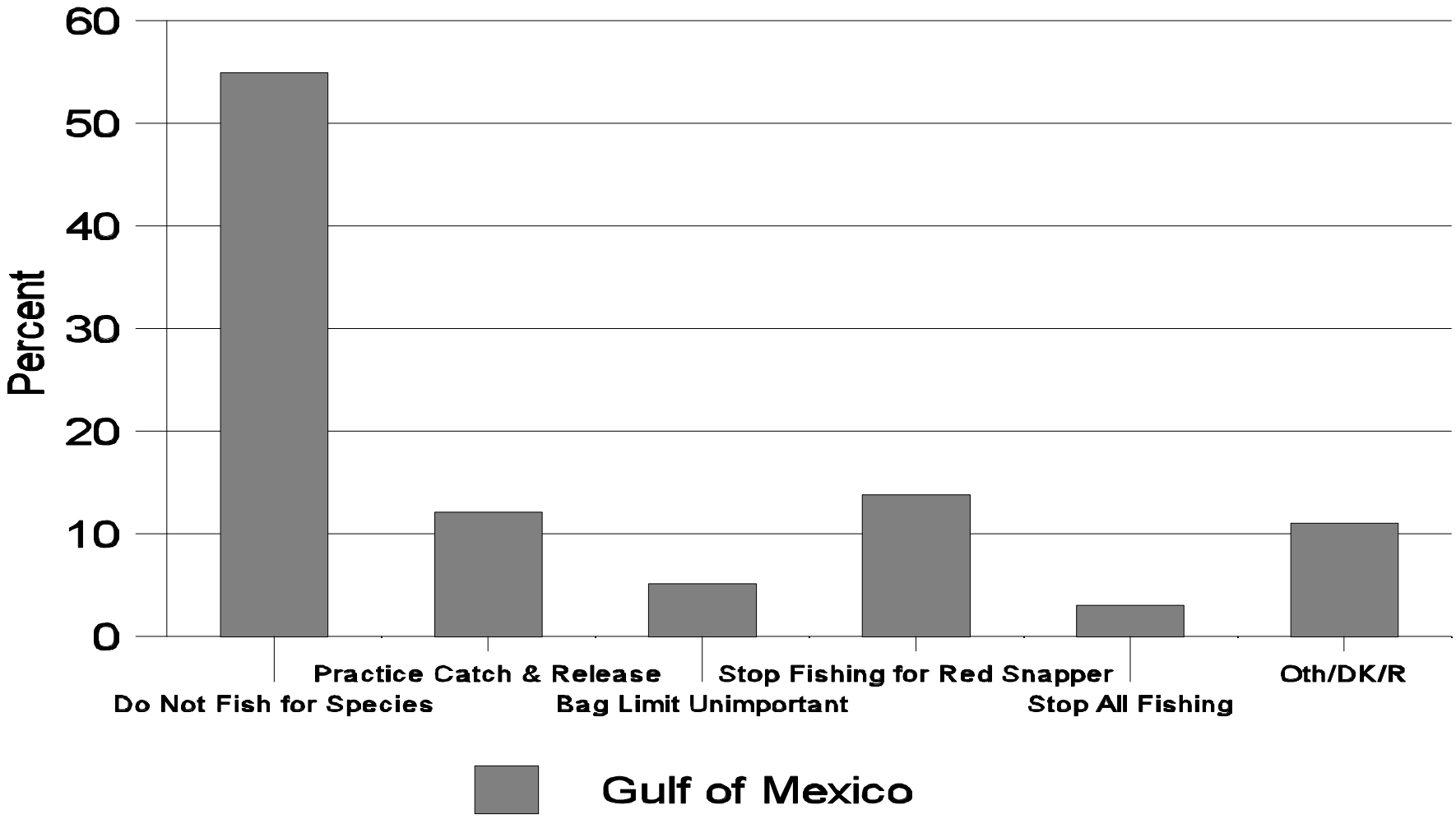

Figure 11 Distribution of Recreational Anglers' Stated Reaction to a Zero Bag Limit for Red Snapper, Red Snapper Anglers

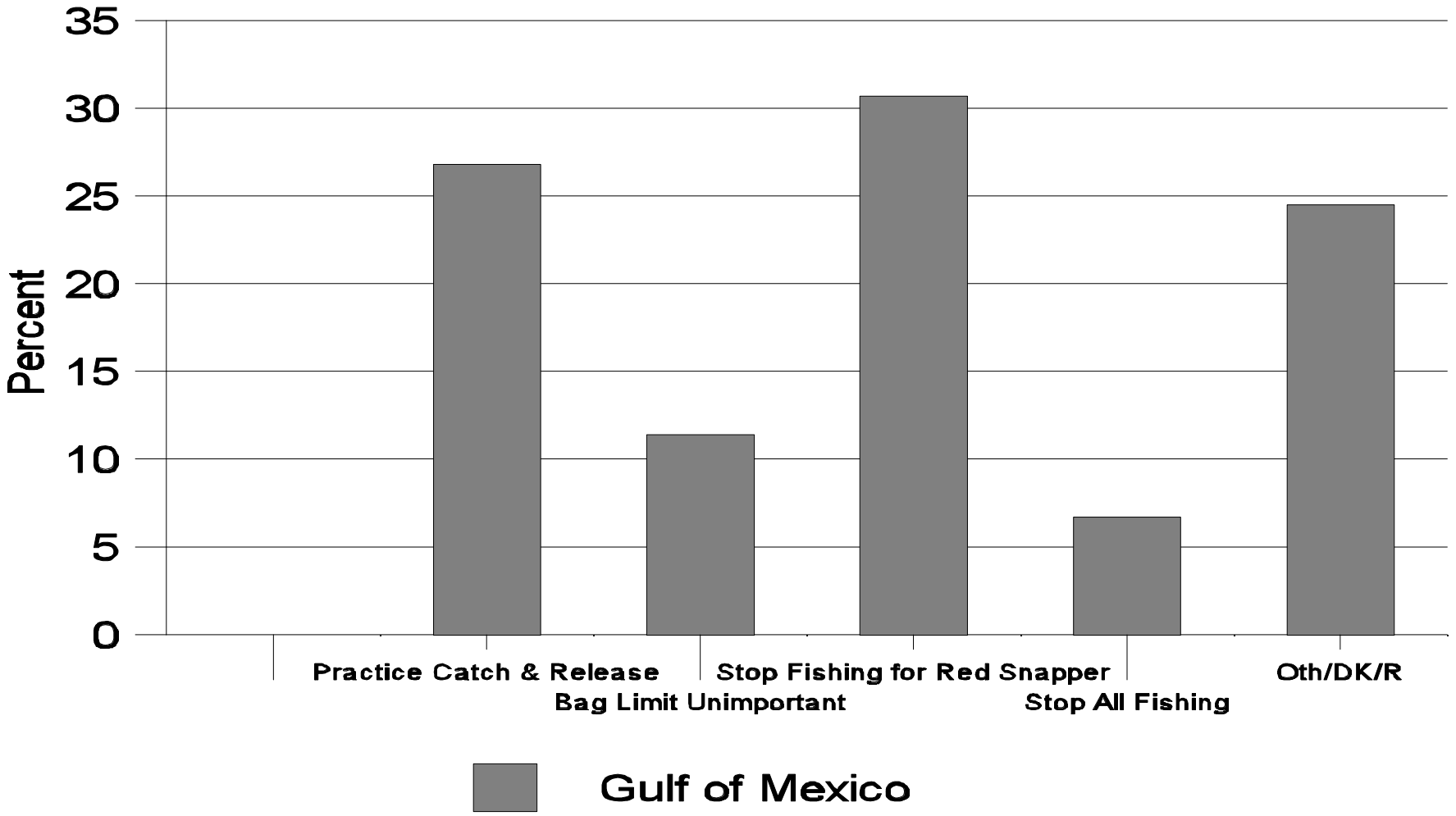

Figure 12 Distribution of Recreational Anglers' Expectations of Catching and Keeping the Legal Red Grouper Limit, by Subregion

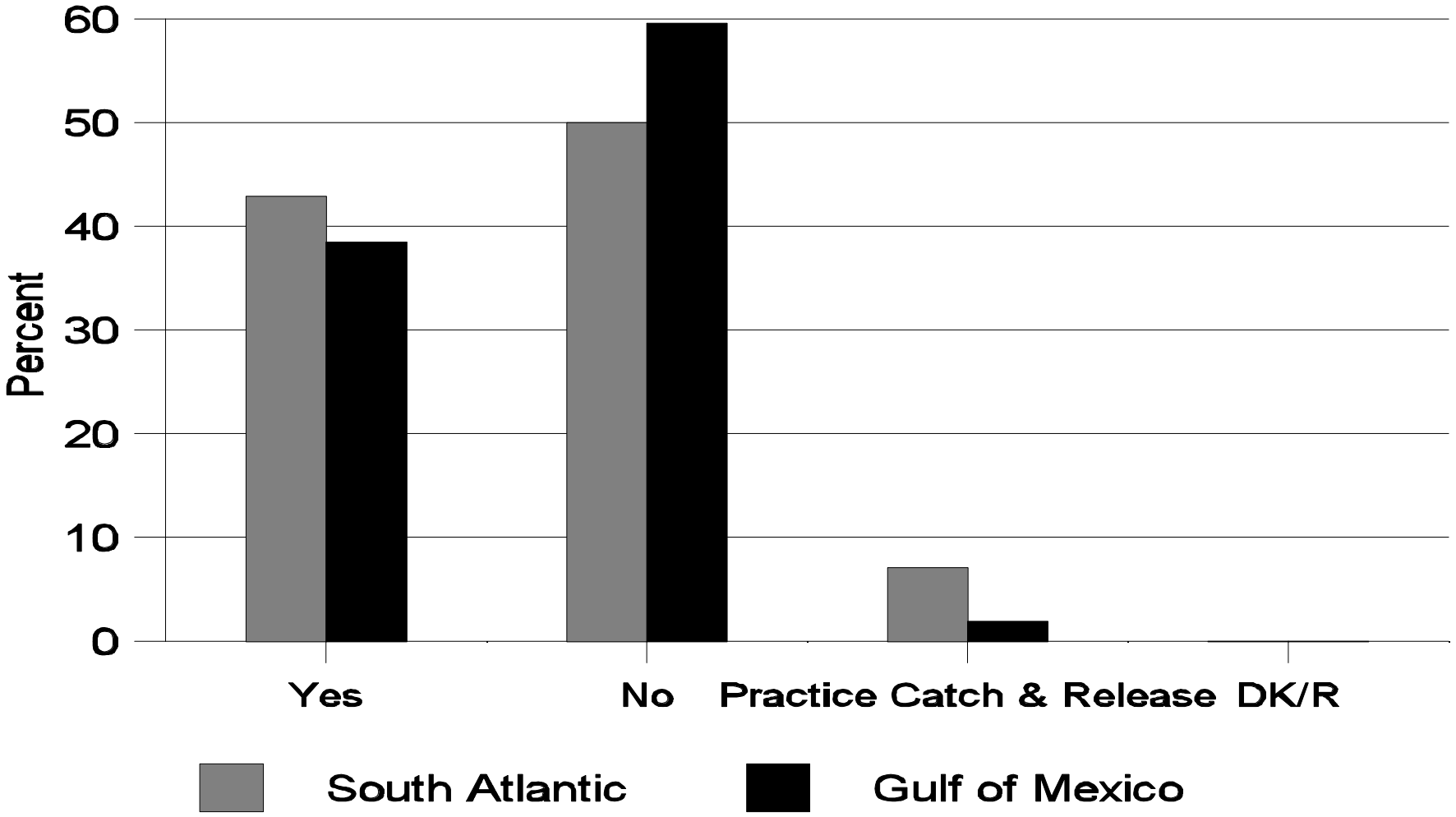

Figure 13 Direction of Recreational Anglers' Behavioral Change in Response to Red Grouper Regulations

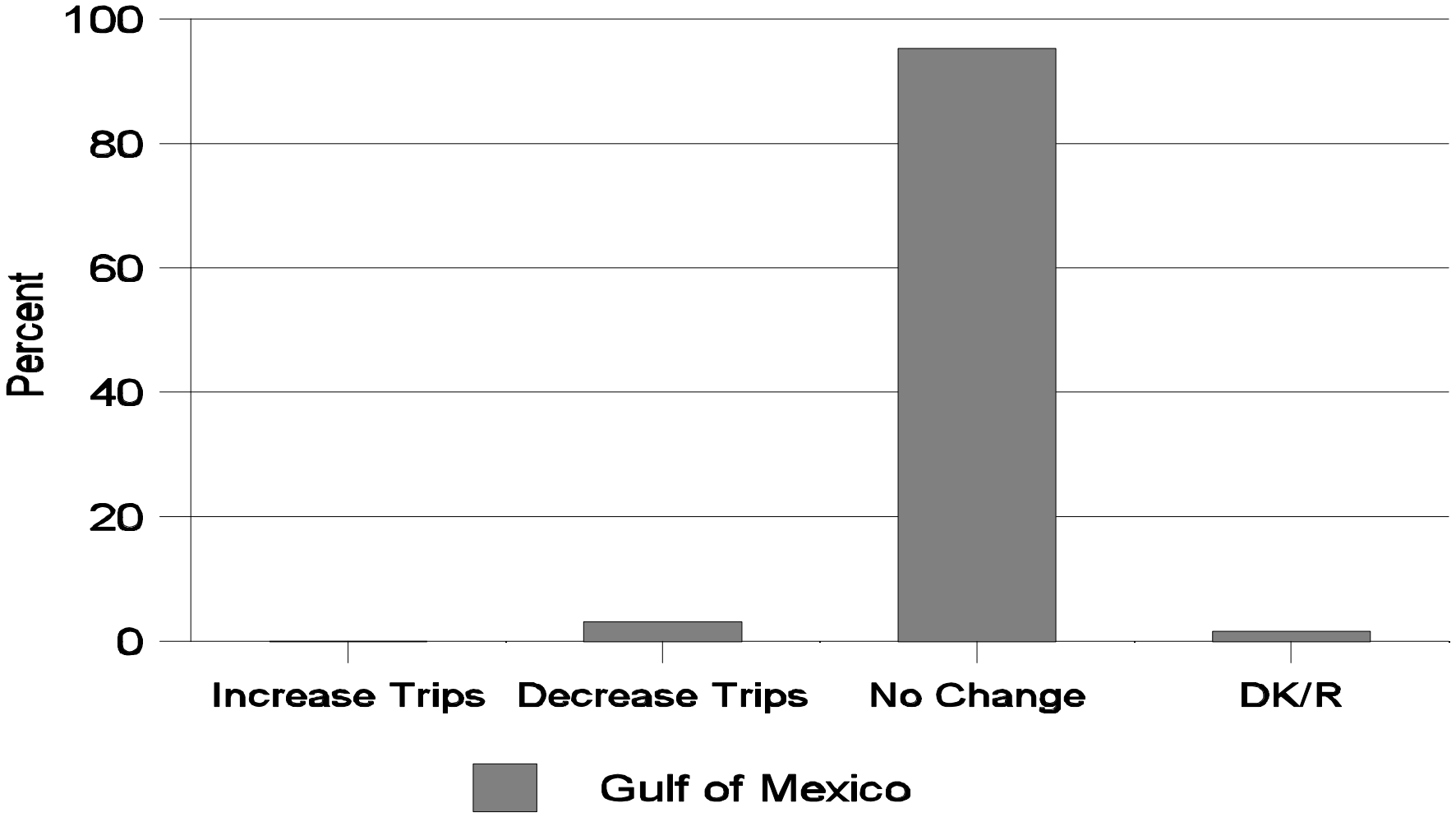

Figure 14 Magnitude of Recreational Anglers' Behavioral Change in Response to Red Grouper Regulations

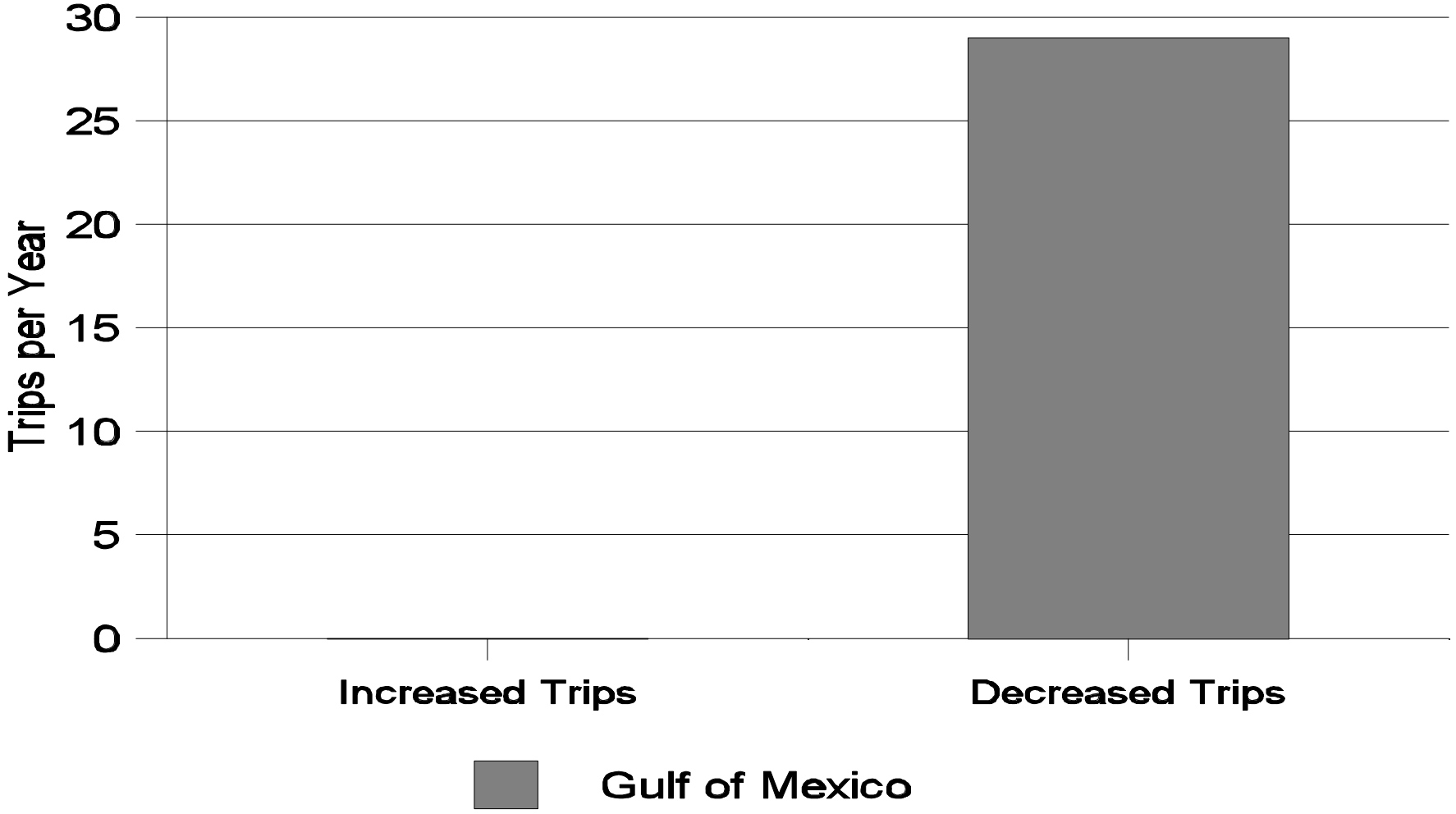

Figure 15 Direction of Recreational Anglers' Behavioral Change in Response to Red Grouper Catch Rates

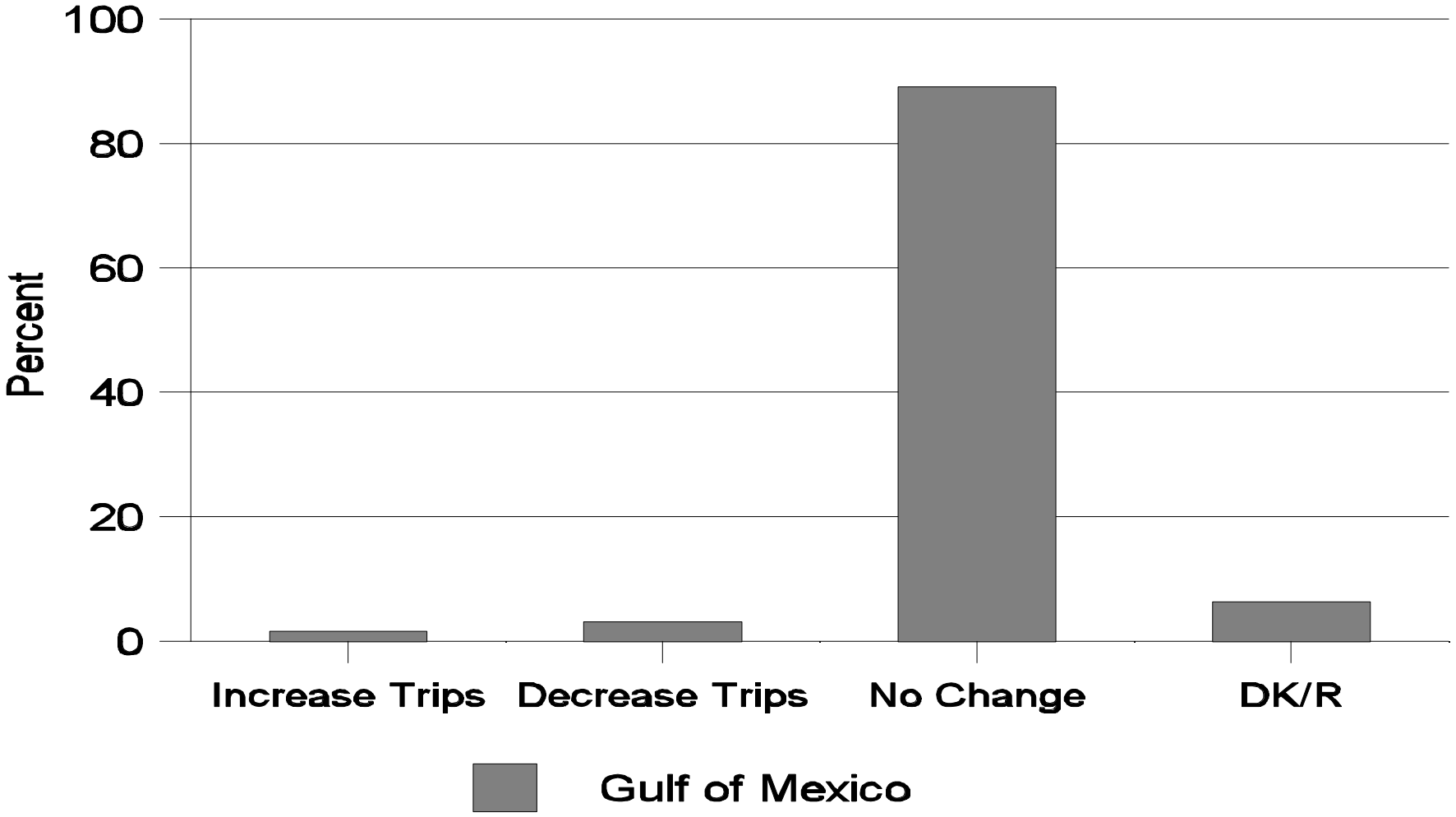

Figure 16 Magnitude of Recreational Anglers' Behavioral Change in Response to Red Grouper Catch Rates

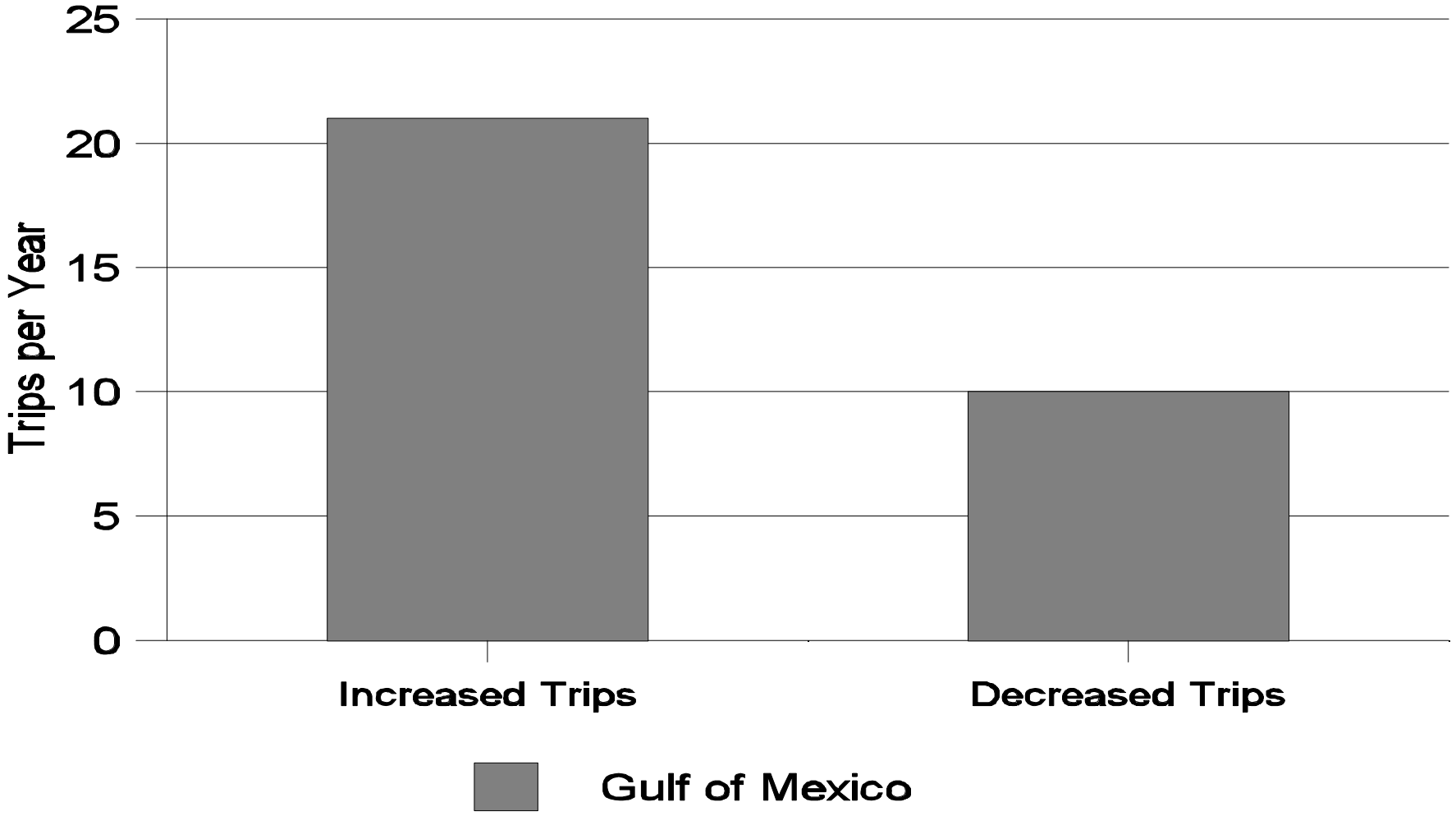

Figure 17 Distribution of Recreational Anglers' Targeting New Species in Response to Red Grouper Regulations or Catch Rates

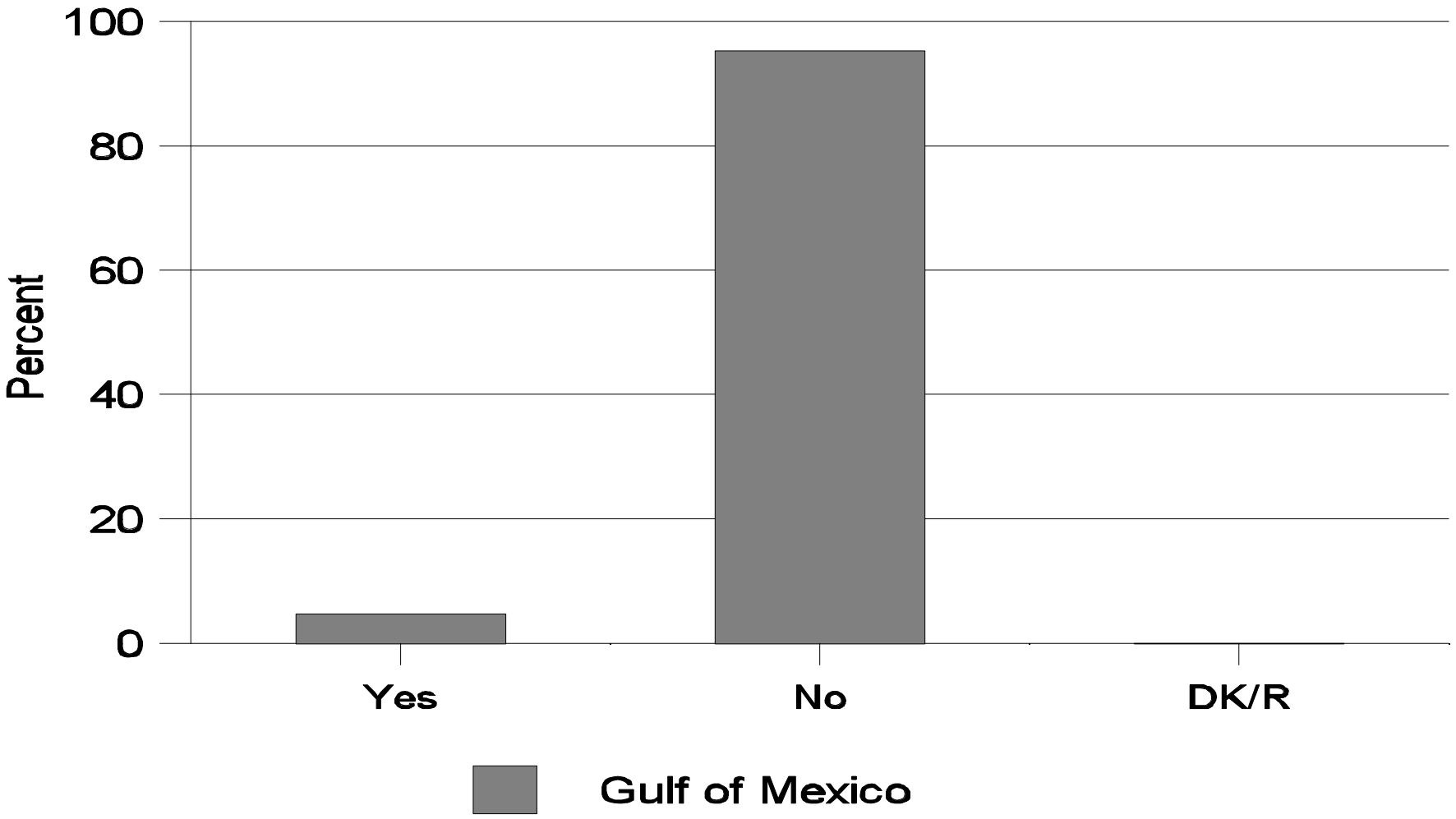

Figure 18 Distribution of Recreational Anglers' New Target Species in Response to Red Grouper Regulations or Catch Rates

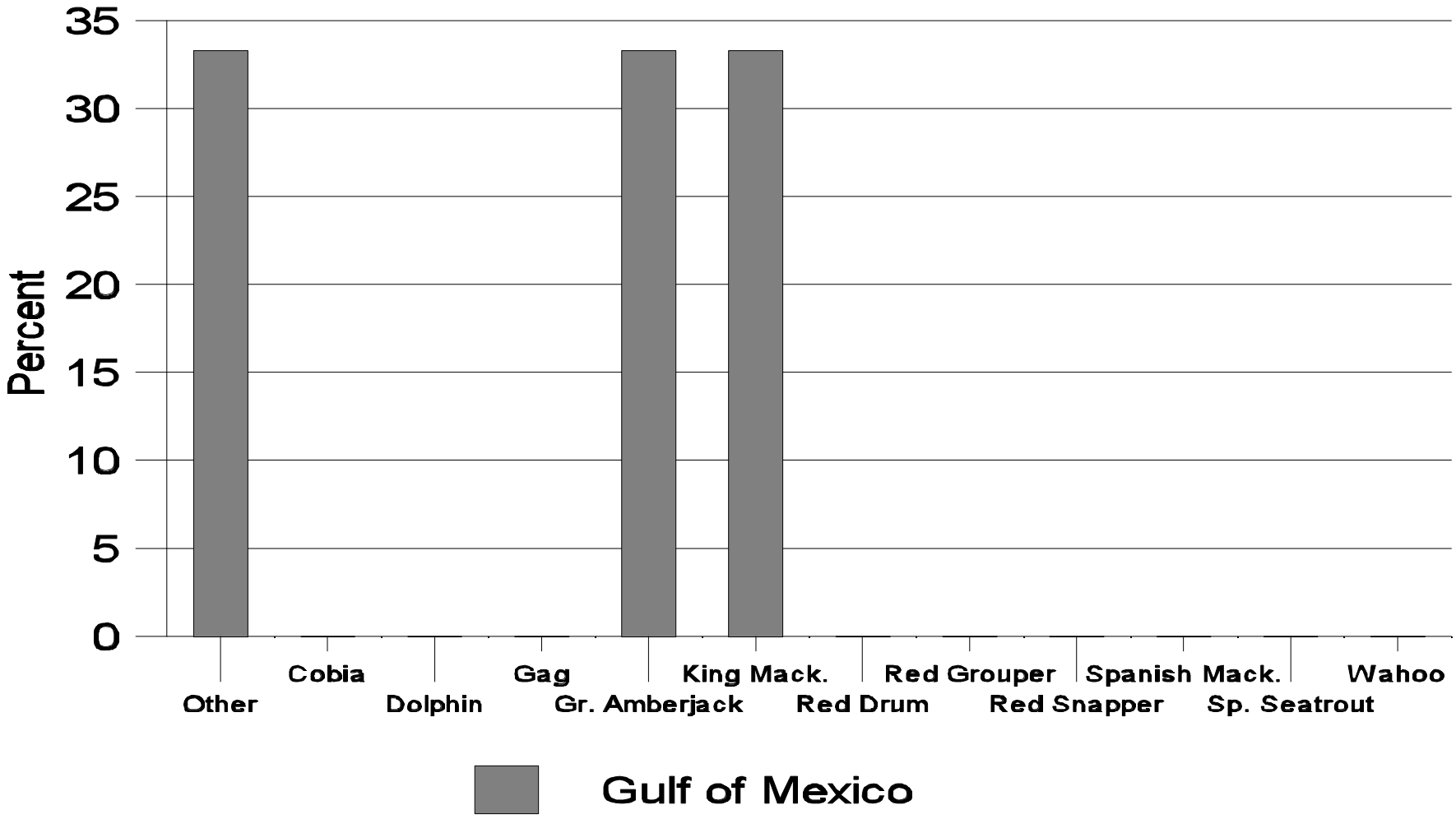

Figure 19 Distribution of Recreational Anglers' Expectations of Catching and Keeping the Legal Gag Limit, by Subregion

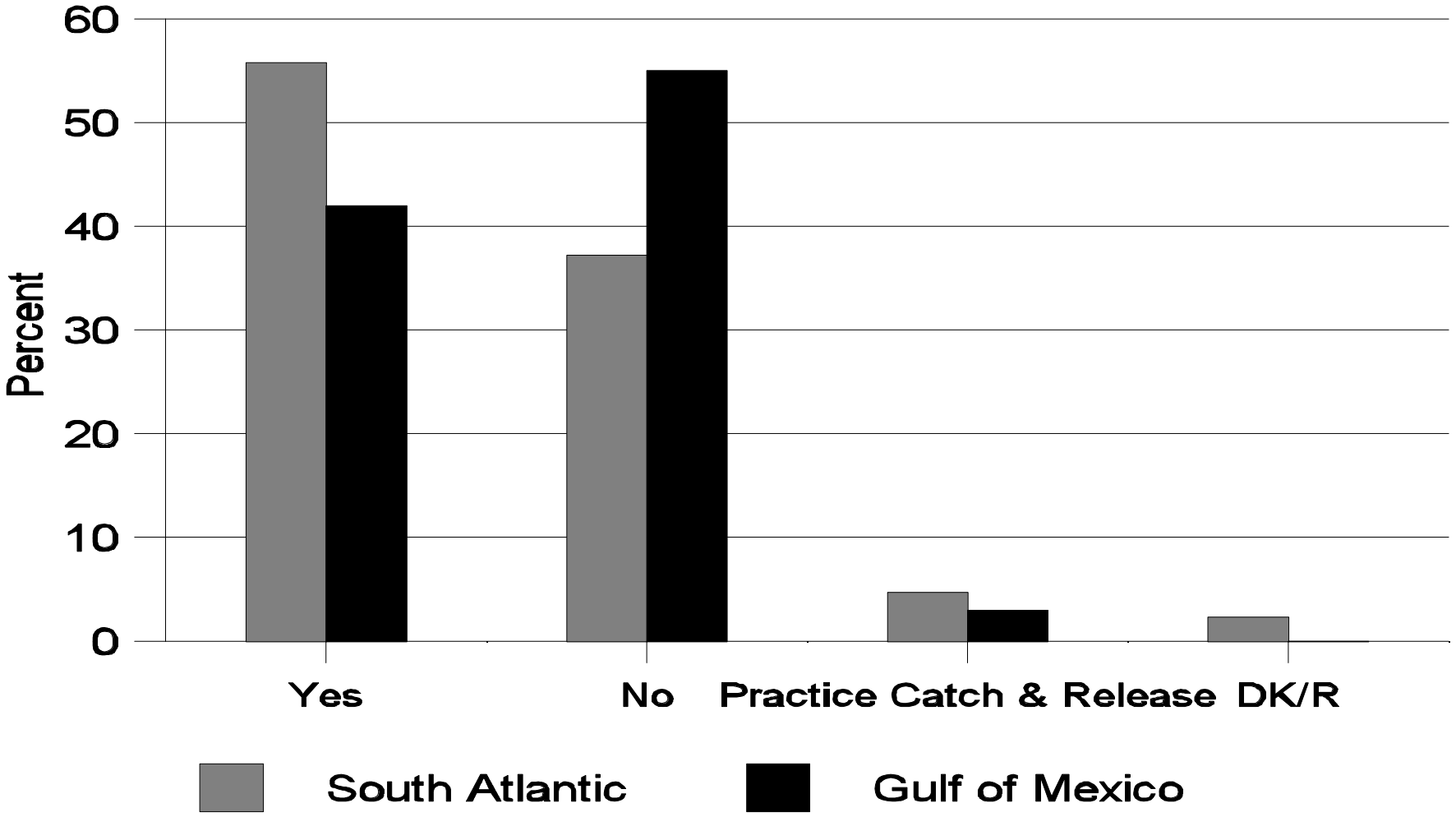

Figure 20 Direction of Recreational Anglers' Behavioral Change in Response to Gag Regulations

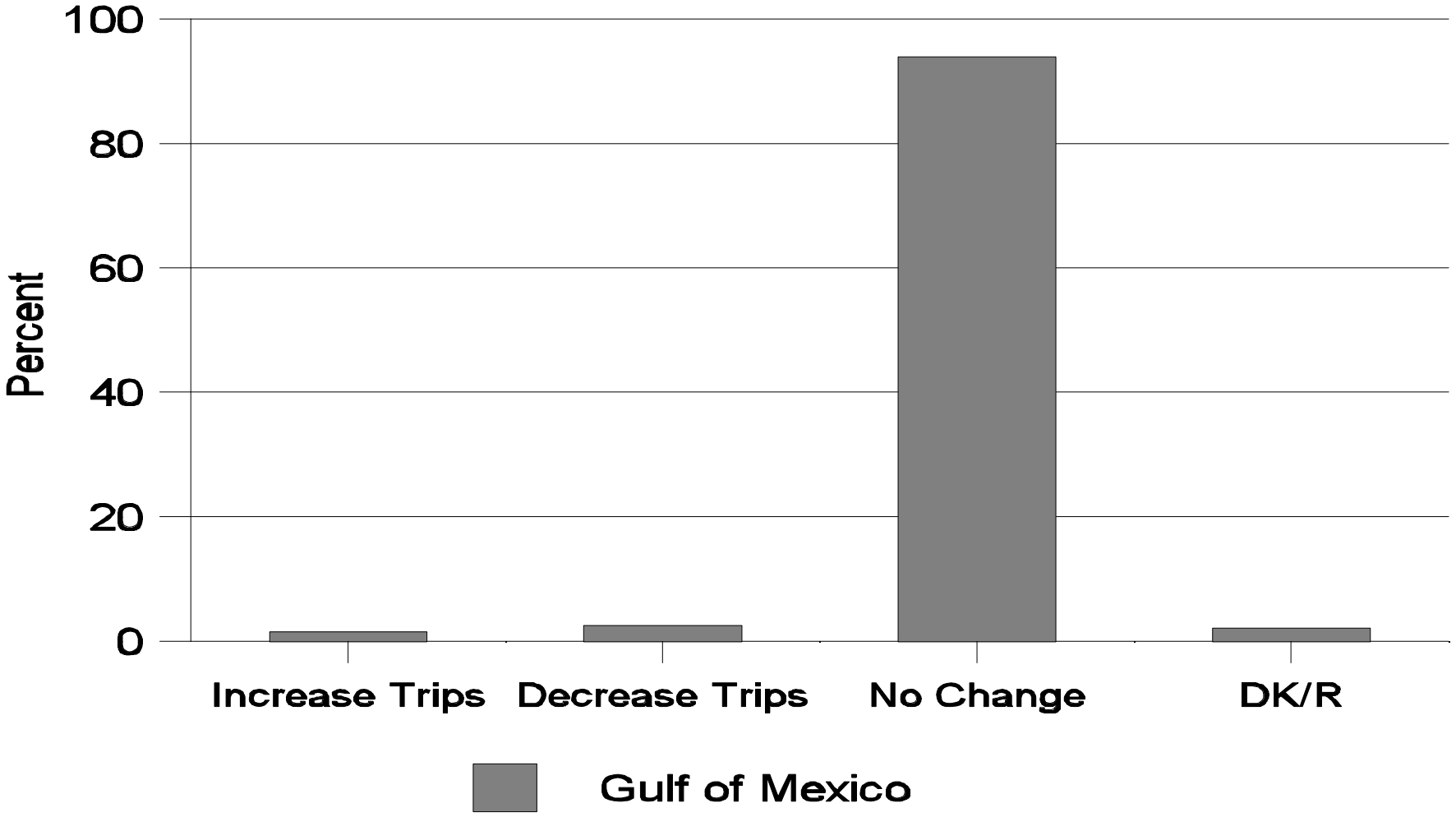

Figure 21 Magnitude of Recreational Anglers' Behavioral Change in Response to Gag Regulations

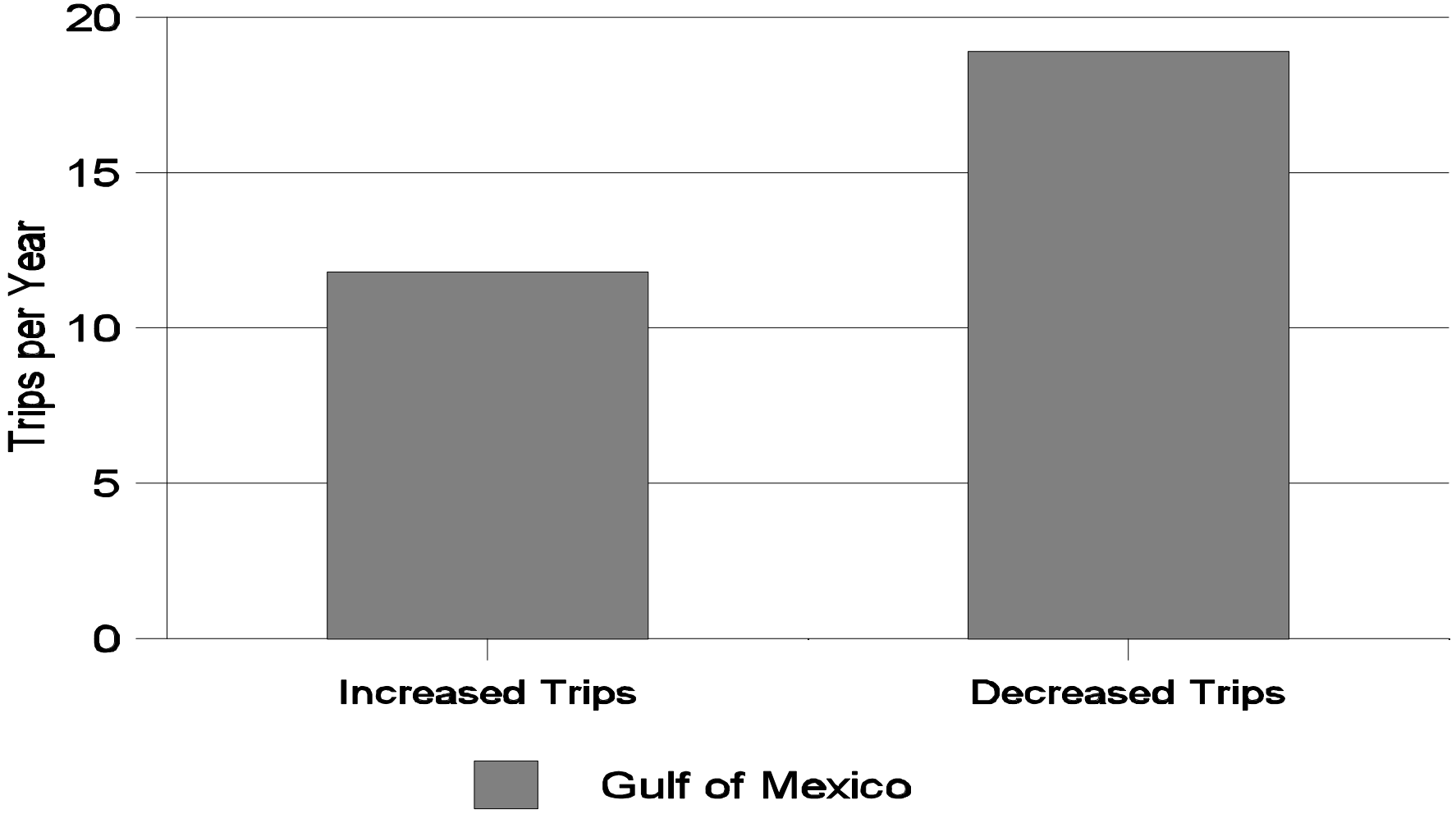

Figure 22 Direction of Recreational Anglers' Behavioral Change in Response to Gag Catch Rates

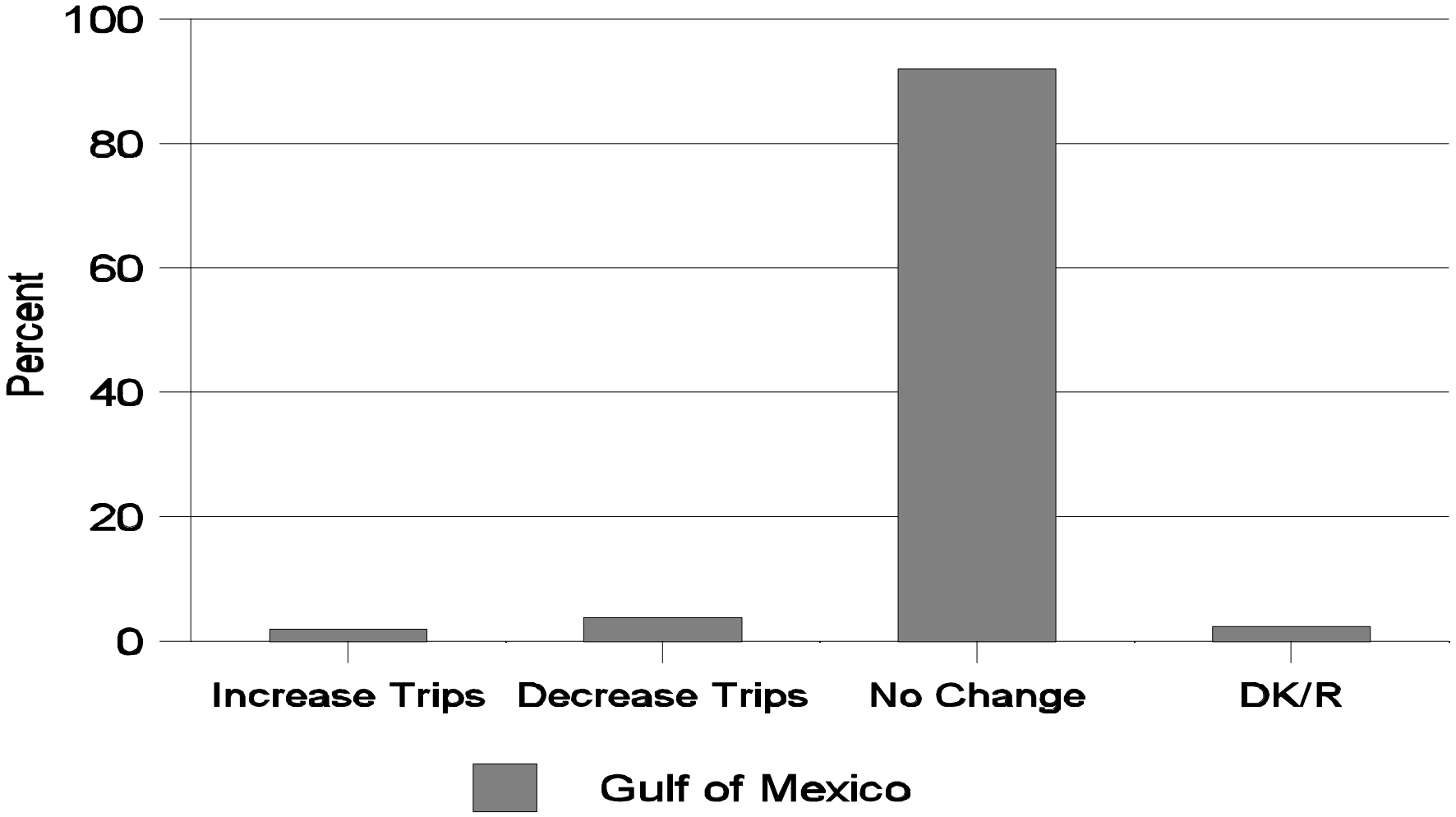

Figure 23 Magnitude of Recreational Anglers' Behavioral Change in Response to Gag Catch Rates

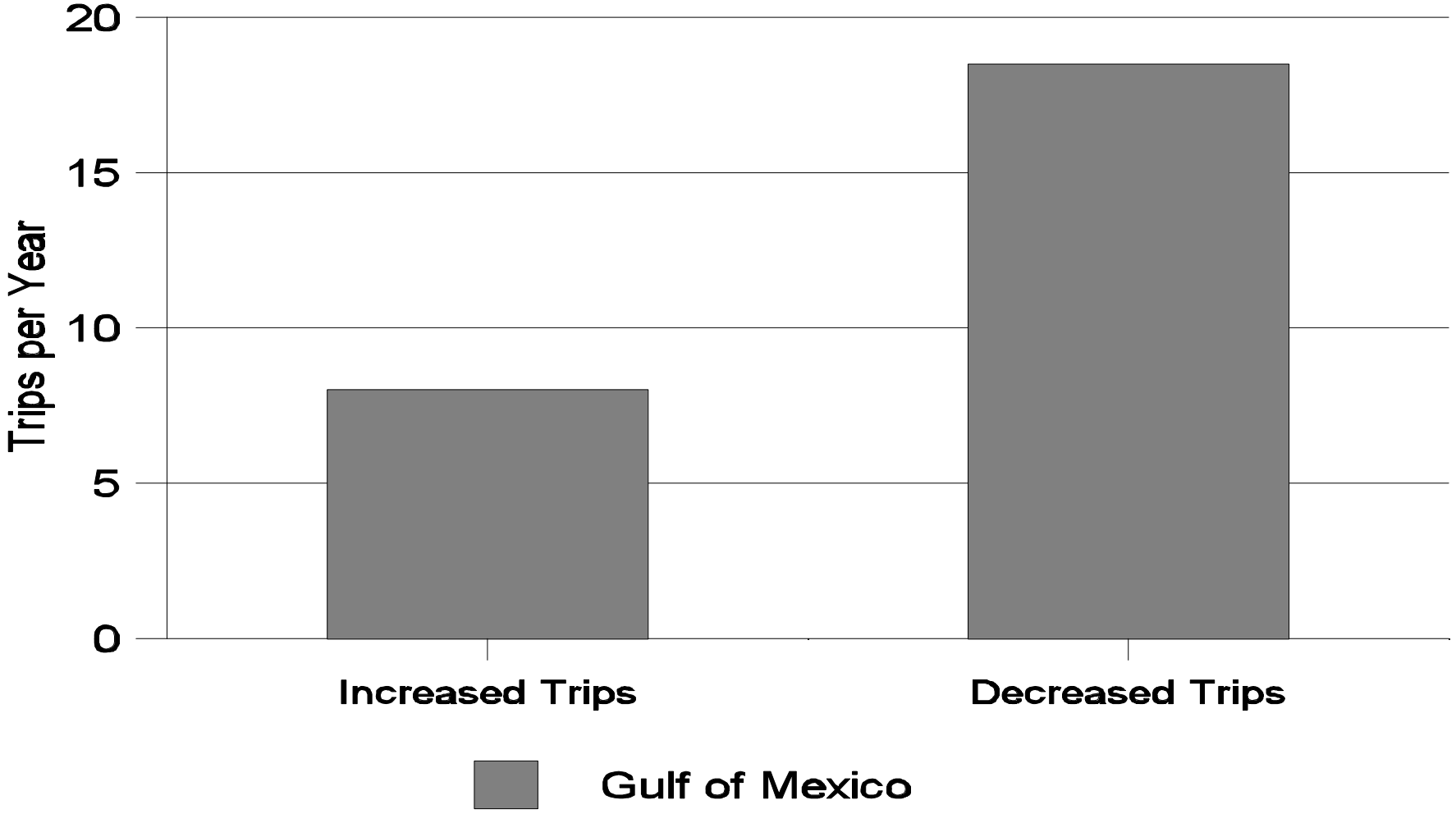

Figure 24 Distribution of Recreational Anglers' Targeting New Species in Response to Gag Regulations or Catch Rates

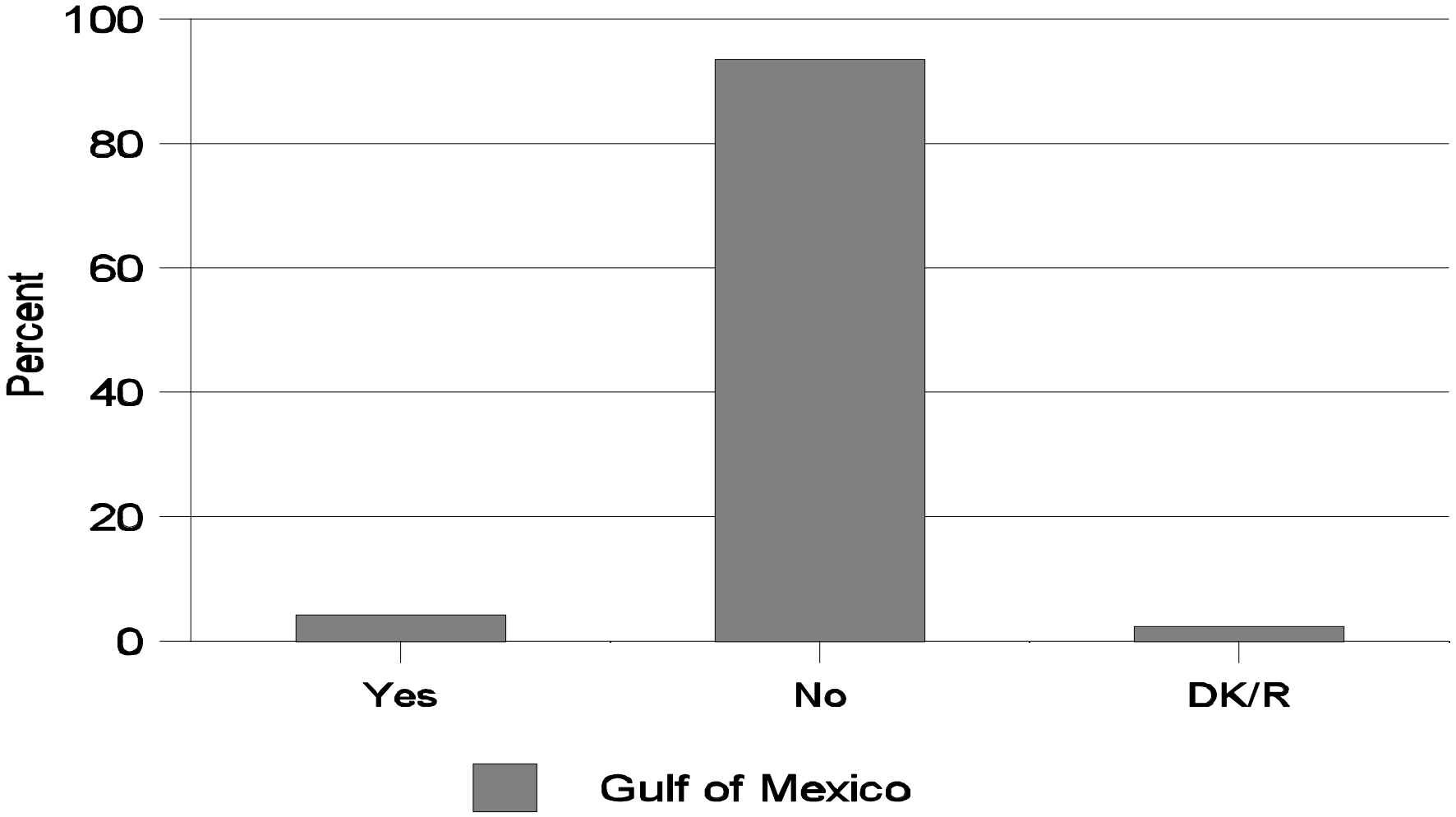

Figure 25 Distribution of Recreational Anglers' New Target Species in Response to Gag Regulations or Catch Rates